COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF AGRICULTURE.

BULLETIN No. 182.

PROCEEDINGS

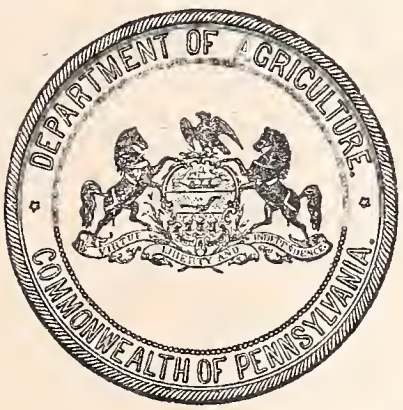
OF THE

Farmers' Annual Normal Institute,

AND SPRING MEETING

STATE BOARD OF AGRICULTURE.

COMPILED BY A. L. MARTIN, *Director of Institutes.*



HELD IN THE

COURT HOUSE

YORK, PA.

MAY 25 TO 28, 1909,

HARRISBURG, PA.:
HARRISBURG PUBLISHING CO., STATE PRINTER.
1909.

VIRTUE
LIBERTY AND

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PREFACE.

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., June 20, 1909.

There is perhaps no source of information upon subjects relating to either practical or scientific agriculture that is so easily available as the Farmers' Institute, and whatever adds to the efficiency of these institutes is of paramount importance. The hope of increasing their usefulness to the farmers of the State has led to the establishment of what is known as the Farmers' Normal Institute, in which all institute managers and lecturers of the State come together once a year for consultation and instruction.

In order that the instruction given at these institutes may be available to the greatest possible number, this Department publishes in bulletin form their proceedings, and so we send out the following bulletin, No. 182, containing the full proceedings of the Normal Institute held at York, Pa., May 25-8, 1909, in the hope that it may prove helpful upon the many farms and in the many farmhouses to which it may come.

N. B. CRITCHFIELD,
Secretary of Agriculture.

LETTER OF TRANSMITTAL.

Commonwealth of Pennsylvania,
Department of Agriculture,
Harrisburg, Pa., June 15, 1909.

Hon. N. B. Critchfield, Secretary of Agriculture:

Dear Sir: I have the honor to present herewith, bulletin of the Eighth Annual "Farmers' Normal Institute," which was held at York, Pa., May 25 to 28, 1909.

Very respectfully,

A. L. MARTIN,
Director of Institutes.

MEMBERS

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE,

FOR THE YEAR 1909.

Members Ex-Officio.

HON. EDWIN S. STUART, Governor.
HON. HENRY HOUCK, Secretary of Internal Affairs.
DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
DR. EDWIN EARLE SPARKS, President of the State College.
HON. ROBERT K. YOUNG, Auditor General.
HON. N. B. CRITCHFIELD, Secretary of Agriculture.

Appointed by the Governor.

Gen. James A. Beaver, Centre County, ...Term expires 1910
R. I. Young, Middletown, Dauphin County, ...Term expires 1911
R. H. Thomas, Jr., Mechanicsburg, Cumberland County, ...Term expires 1912

Appointed by the State Poultry Association.

J. D. Nevius, ...Philadelphia,.....1910

Elected by Country Agricultural Societies.

			Term expires.
Adams,	A. I. Weidner,	Arendtsville,	1912
Allegheny,	A. J. Purdy,	Imperial, R. F. D. No. 1,	1912
Armstrong,	S. S. Blyholder,	Neale,	1911
Beaver,	A. L. McKibben,	New Sheffield,	1911
Bedford,	David W. Lee,	Bedford,	1912
Berks,	H. G. McGowan,	Geiger's Mills,	1910
Blair,	Howard Cox,	Bellwood,	1911
Bradford,	Edwin Platt,	Wysox,	1910
Bucks,			
Butler,	N. F. Bartley,	Euclid,	1911
Cambria,	H. M. Gooderham,	Patton, R. F. D.,	1910
Cameron;			
Carbon,			
Centre,	John A. Woodward,	Howard,	1912
Chester,	M. E. Conard,	Westgrove,	1912
Clarion,	S. X. McClellan,	Knox,	1910
Clearfield,	E. M. Davis,	Grampian,	1910
Clinton,	J. A. Herr,	Millhall, R. F. D.,	1911
Columbia,	A. P. Young,	Millville,	1912

			Term expires.
Crawford,	J. F. Seavy,	Saegerstown,	1911
Cumberland,			
Dauphin,			
Delaware,	E. J. Durnall,	Swathmore,	1911
Elk,	John M. Witman,	St. Mary's,	1911
Erie,			
Fayette,			
Forest,			
Franklin,	John P. Young,	Marion,	1911
Fulton,	J. L. Patterson,	McConnellsburg,	1910
Greene,	N. M. Biddle,	Carmichaels,	1910
Huntingdon,	Geo. G. Hutchison,	Warrior's Mark,	1912
Indiana,			
Jefferson,	Peter B. Cowan,	Brookville,	1910
Juniata,	Matthew Rodgers,	Mexico,	1912
Lackawanna,	Horace Seamans,	Factoryville,	1910
Lancaster,			
Lawrence,	Sam'l McCreary,	Volant,	1909
Lebanon,	H. C. Snavely,	Cleona,	1910
Lehigh,	P. S. Fenstermaker,	Allentown,	1912
Luzerne,			
Lycoming,	A. J. Kahler,	Hughesville,	1912
McKean,			
Mercer,	W. C. Black,	Mercer,	1911
Mifflin,	M. M. Naginey,	Milroy,	1910
Monroe,	R. F. Schwarz,	Analomink,	1911
Montgomery,	J. Sexton,	North Wales.	1911
Montour,			
Northampton,	C. S. Messinger,	Tatamy,	1912
Northumberland,	I. A. Eschbach,	Milton, R. F. D.,	1911
Perry,	A. T. Holman,	Millerstown,	1910
Philadelphia,	Edwin Lonsdale,	Girard College, Phila.,	1910
Pike,			
Potter,	H. H. Hall,	Ellisburg,	1909
Schuylkill,	W. H. Stout,	Pinegrove,	1910
Snyder,	J. F. Boyer,	Freeburg,	1909
Somerset,	John C. Weller,	Rockwood,	1911
Sullivan,	E. R. Warburton,	Campbellsville,	1912
Susquehanna,	Frank A. Davies,	Montrose,	1910
Tioga,	E. B. Dorsett,	Mansfield,	1911
Union,	J. Newton Glover,	Vicksburg,	1911
Venango,			
Warren,	R. J. Weld,	Sugargrove,	1911
Washington,	D. S. Taylor,	Burgettstown,	1911
Wayne,	Warren E. Perham,	Pleasant Mount,	1910
Westmoreland,	M. P. Shoemaker,	Greensburg,	1910
Wyoming,	D. A. Knuppenburg,	Lake Carey,	1910
York,	G. F. Barnes,	Rossville,	1911

OFFICERS.

PRESIDENT.

Hon. Edwin S. Stuart, Governor, ... Harrisburg.

VICE PRESIDENTS.

J. A. Herr, ... Millhall.

(The second Vice-Presidency is vacant through the death of Mr. S. M. McHenry.)

Jason Sexton, ... North Wales.

EXECUTIVE COMMITTEE.

P. S. Fenstermaker, Chairman, ... Allentown.
H. C. Snavely, ... Cleona.
A. J. Kahler, ... Hughesville.
E. M. Davis, ... Grampian.
W. H. Stout, ... Pinegrove.
H. M. Gooderham, ... Patton.
M. M. Naginey, ... Milroy.
H. G. McGowan, ... Geiger's Mills.
N. B. Critchfield, Secretary, ... Harrisburg.

ADVISORY COMMITTEE.

N. B. Critchfield, Secretary, ... Harrisburg.
A. J. Kahler, ... Hughesville.
H. G. McGowan, ... Geiger's Mills.
P. S. Fenstermaker, ... Allentown.

CONSULTING SPECIALISTS.

Botanist, ...	Prof. W. A. Buckhout, ...	State College.
Pomologist, ...	Gabriel Hiester, ...	Harrisburg.
Chemist, ...	Dr. William Frear, ...	State College.
Vet. Surgeon, ...	Dr. Leonard Pearson, ...	Philadelphia.
Sanitarian, ...	Dr. H. D. Moore, ...	New Lexington.
Microscopist and Hygienist,..	Prof. C. B. Cochran, ...	West Chester.
Entomologist, ...	Prof. Franklin Menges, ...	York.
Ornithologist, ...	Prof. H. A. Surface, ...	Harrisburg.
Meteorologist, ...	Silas R. Eshleman, ...	Harrisburg.
Mineralogist, ...	Baird Halberstadt, ...	Pottsville.
Apiarist, ...	H. C. Klinger, ...	Liverpool.
Geologists, ...	Dr. I. A. Harvey, ...	Lock Haven.
	W. H. Stout, ...	Pinegrove.
Forests and Forestry, ...	Hon. Robert Conklin, ...	Harrisburg.
Feeding Stuffs, ...	G. G. Hutchison, ...	Warriors Mark.

STANDING COMMITTEES.

LEGISLATION.

Hon. H. G. McGowan, Chairman, ... Geiger's Mills.
Hon. A. J. Kahler, ... Hughesville.
Matthew Rodgers, ... Mexico.
S. S. Blyholder, ... Neale.
E. B. Dorsett, ... Mansfield.

CEREALS AND CEREAL CROPS.

A. P. Young, Chairman, ... Millville.

ROADS AND ROAD LAWS.

John C. Weller, Chairman, ... Rockwood.

FRUIT AND FRUIT CULTURE.

D. A. Knuppenburg, Chairman, ... Lake Carey.

DAIRY AND DAIRY PRODUCTS.

Dr. M. E. Conard, Chairman, ... Westgrove.

FERTILIZERS.

R. F. Schwarz, Chairman, ... Analomink.

WOOL AND TEXTILE FIBRES.

D. S. Taylor, Chairman, ... Burgettstown.

LIVESTOCK.

M. P. Shoemaker, Chairman, ... Greensburg.

POULTRY.

H. M. Gooderham, Chairman, ... Patton.

PROCEEDINGS OF THE SPRING MEETING OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE, HELD IN THE COURT HOUSE, YORK, PA., TUESDAY, MAY 25, 1909.

ORDER OF BUSINESS.

Tuesday Morning, May 25, 1909

Call to order at 9.30.

1. Roll-call of Members.
2. Reading of Minutes.
3. Appointment of Committee on Credentials.
4. Reception of New Members and Delegates.
5. Report of Committee on Credentials.
6. Unfinished Business.
7. New Business.
8. Miscellaneous Business.
9. Adjournment.

PROCEEDINGS OF THE SPRING MEETING OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE, HELD IN THE COURT HOUSE, YORK, PA., MAY 25, 1909.

Tuesday, May 25th, 1909, 9.30 A. M.

Vice-President J. A. Herr in the Chair.

The CHAIRMAN: The meeting will please come to order. The first thing on the program is the calling of the roll. The Secretary will please call the roll.

Secretary Critchfield called the roll, in answer to which the following gentlemen answered to their names:

Messrs. Weidner, of Adams County; Blyholder of Armstrong; Lee of Bedford; Bartley of Butler; McClellan of Clarion; Davis of Clearfield; Herr of Clinton; Young of Columbia; Cowan of Jefferson; Rodgers of Juniata; Seamans of Lackawanna; Kahler of Lycoming; Black of Mercer; Schwarz of Monroe; Messinger of Northampton; Hall of Potter; Weller of Somerset; Warburton of Sullivan; Perham of Wayne; Shoemaker of Westmoreland; Knuppenburg of Wyoming, and Barnes of York.

The following members came in later: Messrs. Cox of Blair; Gooderham of Cambria; Woodward of Centre; Conard of Chester; Durnall of Delaware; Hutchison of Huntingdon; McCreary of Lawrence; Sexton of Montgomery; Eschbach of Northumberland; Holman of Perry; Stout of Schuylkill; Dorsett of Tioga; Glover of Union.

A quorum being present at first roll-call, the meeting was open for business.

The CHAIRMAN: Next in order is the reading of the minutes of the last meeting.

The SECRETARY: Mr. Chairman, the minutes are quite lengthy, and it sometimes seems to me that it is a waste of time to read them in full; I shall, of course, be glad to read them if it is so desired, but it seems to me that there are other matters of more importance that we might better devote this time to.

MR. SCHWARZ: I move that the reading of the minutes be dispensed with.

MR. COWAN: I second that motion.

This motion carried in the regular way, and the reading of the minutes dispensed with.

The CHAIRMAN: Next in order is the appointment of a committee on credentials. On that committee I will appoint: Mr. Matthew Rodgers of Juniata County; Peter B. Cowan of Jefferson; Warren E. Perham of Wayne; S. X. McClellan of Clarion, and A. P. Young of Columbia.

This committee will receive whatever credentials there are, and report on them. If there are any persons here having credentials, they will please make it known.

The SECRETARY: There are none in the hands of the Secretary, Mr. Chairman.

The CHAIRMAN: I don't see any new members here, so there will be no action at present; there may be others come in, however, who will have them.

The next item on the program is reports of committees. Are there any reports? No reports; the next is Unfinished Business. What unfinished business have we?

The SECRETARY: No unfinished business appears in the minutes so far as I remember.

The CHAIRMAN: Next in order is New Business.

MR. SCHWARZ: Under the head of new business I would like to inquire whether there is a committee on resolutions existing.

The SECRETARY: No standing committee.

The CHAIRMAN: I would announce that since our last meeting, one of the Vice-Presidents, Mr. S. M. McHenry, of Indiana County, has died, and left a vacancy in the list of Vice-Presidents. It becomes this Board, I think, to take recognition of his death. Any action on my suggestion?

MR. SCHWARZ: I suppose the appointment of a committee is in order. The only reason I hesitate to make a motion is because I don't want to be Chairman of it; however, I will make the motion.

The SECRETARY: This will be an Obituary Committee rather than a committee on resolutions.

The CHAIRMAN: A Memorial Committee is what I would suggest.

MR. SCHWARZ: I make a motion that a Memorial Committee of three be appointed on the death of Brother McHenry.

MR. RODGERS: I second that motion.

This motion was carried in the regular way.

The CHAIRMAN: I appoint on this committee Messrs. Blyholder, Shoemaker and Rodgers.

I would have appointed Brother Clark on this committee, but I recollected that he is no longer a member of this Board. I beg to suggest that this committee be given time until our next annual meeting. The annual meeting is really the time when such action should be taken.

MR. BLYHOLDER: Inasmuch as this committee is not to make a report until the next annual meeting, and many members of the Board are not aware of Brother McHenry's death, I want to simply say that he died very suddenly. He was sitting in the court house, between his two attorneys, having a case tried, and suddenly his head dropped forward, and before they could remove him to the adjoining room, he was dead. He was buried four weeks ago today. I only want to make this explanation at this time.

The CHAIRMAN: Any other new business? Any suggestions to be brought before the Board? This is sort of a formal meeting of the Board.

SECRETARY MARTIN: Mr Chairman, would I be permitted a word? Before leaving the city for this place, I received a letter from the good member from Berks County, Mr. McGowan, whom many of the members of the Board know is under a heavy cloud of affliction by the taking away of his life's partner, Mrs. McGowan. He asked me to make an explanation of his absence, and to remember him very kindly to the Board. I might suggest to the Memorial Committee to take this subject under their consideration.

MR. SCHWARZ: I make a motion that this be referred to the same Committee on Memorial.

The CHAIRMAN: If there are no objections, it will be so referred.

There being no objection, this subject was also referred to the Memorial Committee.

The CHAIRMAN: Has any one any further new business to offer to the Board? Mr. Secretary, I would like you to make some explanation of how the Legislature and the Governor have treated this Board. We are not all advised as to some of these recent transaction in legislative matters. We might know something of what has been done with the Fertilizer law, and such other legislation as affects the interests of the Board.

The SECRETARY: The Legislature made the usual appropriation for carrying on the work of the Board. The request came to me,

as Secretary of the Board, and head of the Department of Agriculture, to cut down the appropriations in the Department just as much as possible. We were getting an appropriation for a larger amount than we were using, and I made a very close calculation, at the same time being sure that the amount asked for was sufficient to meet the expenses of the Board in attending the annual meeting. This appropriation was granted. The appropriations to the different departments of the work were changed somewhat, but it was in accordance with the advice of the head of the Department.

A new Feeding Stuff law was enacted, which does away with some of the objectionable parts of the old law. We found every time we went into court under the old law, that the attorneys questioned the constitutionality of the Act in favor of certain manufacturers of wheat bran, middlings and buckwheat middlings, who were not required to come in under the law. They were not required to come up to the same restrictions as the other feedings stuffs. The question of the constitutionality of the old Act was argued last week, before the court of Lehigh county, but if a decision was rendered, it did not reach me yet. Whether it is sustained or not, will not matter now, for the reason that the new law does away with the supposed inequalities of the old law.

A new Fertilizer law was passed by the last Legislature, which received the approval of the Executive, and which will go into effect the first of July. The old law remains in effect until the first of July. The new Feeding Stuff law, as I remember it now, goes into effect the first of August. I have it in my satchel, but neglected to bring it with me from the hotel.

SECRETARY MARTIN: It goes into effect in August, I believe.

The SECRETARY: Another Act is the Oster Act, which provides that the name "bone" shall not be applied to a fertilizer, unless the phosphoric acid is derived from animal bone. This was to prevent the present deception on the part of certain manufacturers who would call dissolved phosphate rock "bone." People would buy this, thinking they were getting dissolved bone, when in reality they were getting phosphate rock dissolved by sulphuric acid. Now, under this new Act, the word "bone" shall not be used unless the phosphoric acid is from animal bone.

The new Fertilizer law will go into effect the first of July; it repeals the old law. The reason this change was made was that one of the courts of Philadelphia, on being called upon to decide upon the constitutionality of the Act, made the statement that if the manufacturers, under the old law, as it was framed, should pay a license on one brand of fertilizer, they could not be compelled to pay a license on any other, inasmuch as the law did not state specifically that the manufacturer must pay license for each distinct brand. The jury was instructed without leaving the court room to bring in a verdict for the defendant—a verdict of "not guilty," the indictment being for selling goods on which no license had been paid. The court asked whether he had paid any license, and the man replied "yes," but that he made several brands; hence the decision that he need not pay a license on each brand. Because

of this the new law was framed, to embody the good features of the old law, with several improvements.

I think we got about everything that was asked for by the Department, and by the Board, so far as the work of the Department is concerned.

The CHAIRMAN: The Governor approved these bills?

The SECRETARY: Yes, sir.

MR. RODGERS: We have heard about the fertilizer and feed for the animals. There have been some changes in the Pure Food law, which I think goes into effect very soon. The wholesale men have notified the grocers to put out of sight anything green—for instance, pickles, peas and so on, and to keep them out of sight of the Inspector, who may come along at any time. The soft drink box, too, is to be kept out of sight; it is kept in the cellar, and any one who wants a soft drink, must get it behind the door. Now, can the Secretary tell us anything about that?

The SECRETARY: Now, Mr. Chairman, the time these bills were before the Legislature, relating to the Department, I did not keep as close tab on the Pure Food law as I might have done. The principal contention in the Legislature in regard to the Pure Food Bill was over the introduction of the clause permitting the use of one-tenth of one per cent. of benzoate of soda. Some of the members were very much opposed to it, but the Dairy and Food Commissioner, for reasons of his own, considered it right. Another feature of the law, as I understand it, is, that the retailer is not to be prosecuted if he can show a guarantee from the wholesaler or manufacturer, until he has first received at least one notification. The bill relating to the adulteration of soft drinks is simply an anti-adulteration bill. The bill providing for pure alcoholic drinks fell by the way, and failed to become a law. The men who insist on having their drink, must take their chances. While, of course, it may be necessary to caution Brother Rodgers in regard to this, I think on the whole the caution will not be needed here.

The CHAIRMAN: Now, we are all interested in anything that affects the health of the community, and anything that tends to prevent the spread of any contagious disease is of great interest to us. I would like to know what has been done in regard to preventing the spread of tuberculosis in the human family. What special legislation was passed during the last session of the Legislature? Can any one advise us?

The SECRETARY: So far as the law concerning the treatment of tuberculosis, and the treatment of animals affected by it is concerned, there was but little change. The principal change, as I remember it now, was the raising of the amount of money to be paid for condemned animals. There was an effort made to double the amount, but some objection was made on the part of the Department to making it too high. It was not doubled, but was raised something like 50 per cent., I believe. The old appropriation for the inspection of animals that are supposed to be infected goes on just

as before, and the only change made is that a little higher sum is to be paid. I don't remember the exact amount. Formerly $25 was the highest amount paid for an animal that was not registered, and $50 was the largest amount for a registered animal. My recollection now is that the $25 was raised to $40, and the $50 to $75, but I will not speak positively. That is about all I remember that was done pertaining to this subject.

The CHAIRMAN: I might state that we had a little unfortunate experience in Clinton county with the foot and mouth disease, which prevailed in the State, and I don't think that even the Food Department perpetrated as great frauds as were perpetrated in this connection. I don't think we had more than three or four cases there in spite of the reports that we had a great many. I know men who are willing to go on the stand and swear that these herds were not infected at all. They sent a lot of veterinarians there who did not know anything about the disease, and we did not get rid of it until about the 1st of April. Before all of our public sales, these veterinarians, who had their headquarters at Lock Haven, would hire liverymen to take them out to give permission to haul an animal from one place to another. Besides getting a good salary, they were running up large livery bills that were entirely unnecessary, because there was not a single case in the county that occurred when the sales were going on. The people simply denounced it. And not only that; most of these veterinarians were men who became dissipated, and had their drunken orgies where they killed the cattle, and herds were condemned where there was no infection, and had been none. I am pretty positive that one man who had intended having a slae in the spring, brought two calves from Tioga in the fall, and then the veterinarian examined them, and, of course, they had foot and mouth disease, and the whole herd was condemned to be slaughtered, until some of us gave him a warning. We said "we want the disease stamped out as much as anybody, but we know that there is no infection in that herd, and we don't want any fraud in this connection." But the man had probably done something to make their mouths sore. When the State Veterinarian came there to examine them in April, there was no aphthous fever there. I think some men were making it a business to have their herds examined, as a matter of fraud.

The SECRETARY: Was any report made to the State Veterinarian of the fact?

The CHAIRMAN: I think so; in this instance I made a report of it. One or two herds the State Veterinarian never saw. The fact is, that one herd that was killed there was so poor that the assessor did not know what to value them at, because he did not believe they would live until spring anyhow. That was the herd of Harry Martin; and he got a high price for them.

MR. BLYHOLDER: Were they Government officers, or State officials?

The CHAIRMAN: I think they were sent out by the State. I met some of them, but I did not inquire closely into the matter. I have some of the best citizens up in East Martin Township who

are willing to qualify on it that there were herds condemned where there was not proper time allowed to determine whether they were affected or not.

The SECRETARY: It seems to me, Mr. Chairman, that it is hardly fair to Dr. Pearson to have this matter come up when he is not here to make his defense. I am very sure that Dr. Pearson will be ready at any time to make to the Board a statement of the whole matter. This is the first intimation of the matter that I have heard. Of course, as the Chairman says, it should be looked into, and at the proper time a committee will be appointed to look into this matter, but I think Dr. Pearson should be here. I think I am not going too far in saying that he has the confidence of every one of us.

The CHAIRMAN: No censure on Dr. Pearson at all.

The SECRETARY: Of course, I don't know now whether they were appointed by the State Livestock Sanitary Board, or by the National government. When the disease came, it came like thunder from a clear sky, and Dr. Pearson, and all of us, were very anxious to stamp it out at once. Our own State, and other states, were in danger, and we had to act quickly. It was very hard to get competent veterinarians to act. It is only within the last two decades that the University of Pennsylvania has established this as one of its branches. Prior to that we had to get them from Canada, and they were not always what they should have been. I don't doubt that some things were done which should not have been done, but I did not know that anything like this had ever occurred. I think it is unfortunate that the matter should have been referred to when Dr. Pearson was absent, so that he is unable to make any explanation or defense. I don't know just how many, but, but I think at least one-half of the veterinarians were supplied by the National government. We did not have them in this State. Quite a number were employed by the State Livestock Sanitary Board, but I don't know whether they were in Clinton county.

The CHAIRMAN: I want to say that I did not propose to bring this up, or have the Board take any action in the matter. I simply wanted to put that information before the public, and did not intend to cast any reflection on Dr. Pearson. He told me personally that he tried to have the quarantine raised, but the United States Government interfered. I would suggest that the stenographer make no report of this proceeding. I believe Dr. Pearson is conscientious and honest, and there is no person in the Department of Agriculture for whom I have more respect than for Dr. Pearson, and I would suggest that there is no report made of this discussion.

The SECRETARY: I am very glad that this suggestion was made. I was tempted to make a motion myself because of the very high respect and confidence I have in Dr. Pearson. It is merely a little informal talk, such as might have taken place at a hotel or some other place.

The CHAIRMAN: Yes, sir; I simply brought it out in an informal way, that could be understood here.

MR. RODGERS: I think it is very well to have it discussed, because I learned something; there are tricks in all trades. In speaking of the holding on of the quarantine, and the large amount of stock killed, I would say that there was a large amount of stock killed in our county, but I was not curious enough to go and see it. One man, who was a little curious in his make-up, went there, and before he went away they said "Hold on; we must fumigate you." He said, "I don't want to join that church," but they made him join it before he left. I think, however, if they are going to do anything, hold on until the disease is stamped out.

In regard to the quarantine, there is one thing I want to talk about, and that is the distemper. It took away thousands of dollars' worth of horses in our county this year, and it spread and spread all over the southwestern part of the county, and some of the best horses in county fell a prey to it. It seemed to be carried by people driving horses which had the disease. Now, I don't know that there is anything in the law to prevent a man from driving his own horse, or hitching his horse where you will hitch your horse, or water him out of the same trough, but there ought to be something done that will prevent the spread of the disease. Now, I drove five miles out of my way to get out of the Academia district, where they had it, but the next morning I found that eight or nine horses in the same barn where I had mine, were affected with the distemper. I simply kept my horse in the barn until he got well.

The CHAIRMAN: He got the distemper, did he?

MR. RODGERS: He did; and got it good and proper.

The SECRETARY: The Legislative Committee will take notice.

MR. PERHAM: The price paid by the State to State Veterinarians is $5 per day, is it not?

The SECRETARY: Some of them are employed by the month; five dollars a day is the usual amount.

MR. PERHAM: Well, I know some veterinarians employed by Dr. Pearson whose private practice brings them three or four times that amount.

The SECRETARY: Some of them sacrificed their own practice, and worked from patriotic motives, but they were not all of that kind.

The CHAIRMAN: Anything further? There are a whole lot of subjects on which we are interested and can talk on when we get together. I want to say that this subject has drifted away from what I meant when I asked what had been done in regard to tuberculosis in the human family. The Secretary turned the subject over to the animals killed, and left the other untouched. That was what I was driving at, to find out what appropriation had been made for that.

The SECRETARY: Well, I was looking after the farmers' end of it.

The CHAIRMAN: I did not imagine it would drift on that line, but when it did, I thought it might be well to speak of some of the abuses in the matter of the aphthous fever. I believe that they slaughtered animals on Sunday and had a drunken orgy. I don't think that was referred to, and it got a good many of our good people down on the matter.

MR. CLARK: I would move out of that county.

MR. SCHWARZ: That was a barbacue.

The SECRETARY: When you are making a fight against a case of that kind, it is war, and it is a serious thing.

MR. HALL: Some of the biggest battles were fought on Sunday. I might give you my own experience in this matter. I thought it had broken out in our county, and at once telephoned Dr. Pearson; he replied that no competent veterinarians were at his command; he would send the best he had, and apply to the United States for them. As to the continuance of the quarantine, that has been explained according to the wording out in our place. Long after Dr. Pearson would have raised the quarantine, the United States Commissioner at Washington wrote me that it was better for Pennsylvania and the United States Government to spend a thousand dollars unnecessarily than that one case should be left in the State. Now the man in whose herd it broke out calls the assistants of Dr. Pearson "hoboes," and states that there was nothing the matter with his cattle, but I am stating facts exactly as they were.

As a cattle dealer, I went to buy cows out of his herd in September, but the price was prohibitive. Along in October he called me up, and offered me the same cattle for less than half price. I asked him what the matter was, and he said they were a little bit off. I talked with him until I was satisfied that he had a case that ought to be reported. I told him I was going to report it, and he said I need not, because the veterinarian would not get admission to his barn. This man was delivering milk to our cheese factory at Ellisburg, where it was made into cheese sold in the open markets of Philadelphia. When I drove up with Dr. Pearson's assistant, so that he could get admission to the barn, you could smell the disease before you got to the barn. It was a very bad case of flies, and this milk was delivered to the factory and made into cheese, and now this man and some of his neighbors who were compelled to clean up and put their milk into a healthy condition before it would be accepted again, call Dr. Pearson's assistants "hoboes"!

I would suggest that the head of the Department here take up the matter with the United States about the veterinarians they send out, not criticising the State Veterinarian and his assistants. I think this has had a great deal to do with the dissatisfaction. Dr. Pearson said very plainly that he did not have competent assistants, and while there was graft, every dollar of this money, including the abuses, was well spent.

MR. KAHLER: We have had the same trouble with the disease in our county, and our complaints were very similar. While there may have been some abuses, I believe with Mr. Hall that every

dollar was well spent, including the abuses, and we were fortunate in getting the disease stamped out as we did. I think it is not becoming this Board to take any action, such as has been suggested. Don't kick until you are spurred. They stamped it out of our county, where if they had taken the advice of the interested men themselves, and their neighbors, we would have had it all over the county. I believe every dollar was well spent.

The CHAIRMAN: Anything further?

MR. BLYHOLDER: Let us get back to the original question—your question as to the "white plague."

The CHAIRMAN: What has been done towards stamping out the disease in the human family? Any one prepared to tell us? No one seems willing to volunteer. Is that all we have under new business?

MR. CLARK: There is a matter that we have to contend with every year in our vicinity; we don't know how to get it remedied, but I think it is well worth while looking into. Some years ago we had quite a scourge of smallpox in our village, and every year since there is an effort made to clear up the town. It begins with the coal companies—whitewash, paint, &c., and the property holders are beginning to appreciate the value of it. Yet there are some places that are eye sores. We have a health officer who will wade through it knee deep. The only thing to do is to get some one there who will make a complaint to him, and then he will make a complaint to the Board of Health at Harrisburg. It is like a case of riot, where you have to kill a man in order to stop it. There is a great deal of this, especially about the butcher shops, and the Board of Health man will walk through it knee deep. The only way to do is to make a report, and then he will make a report and then some one will look into it. We get so tired of it—so tired of seeing this thing go on that we are going to get it done at our own expense. I know there is plenty of money appropriated; the Legislature is liberal in this respect to the little towns that have not enough money to clean up their own towns. The coal companies are liberal, and it seems to me that there should be some way of reaching this evil.

The SECRETARY: Have the butcher shops been reported to the State Livestock Sanitary Board? Where information is given that some one is needed, some one will be sent.

MR. CLARK: So far as the slaughter house is concerned, there is no complaint to be made, but farmers will go out and buy two or three carloads of cattle, and slaughter them on their own premises, or take them to the towns of four or five thousand people, and sell them, and the people will slaughter them on their own premises, and the offal remains there. The western people furnish all the meat to the slaughter houses proper.

The CHAIRMAN: Any further business? Any miscellaneous business?

The SECRETARY: I move we adjourn.

MR. BLYHOLDER: I second that motion.

This motion was carried in the regular way.

MR. MARTIN: One moment, before adjournment; at 1.30 this afternoon the Annual Normal Institute will be held here in the court room. We hope to have you all with us.

Adjourned.

(Note—Additional proceedings on page 88.)

A. B. Critchfield

Secretary of Agriculture.

LIST OF COUNTY INSTITUTE MANAGERS FOR SEASON OF 1908-9.

County.	Name and Address of Chairmen.
Adams,	A. I. Weidner, Arendtsville.
Allegheny,	J. S. Burns, Imperial, Pa., R. F. D. No. 1.
Armstrong,	S. S. Blyholder, Neale.
Beaver,	A. L. McKibben, New Sheffield.
Bedford,	David W. Lee, Bedford.
Berks,	H. G. McGowan, Geiger's Mills.
Blair,	Howard Cox, Bellwood.
Bradford,	Edwin Platt, Wysox, R. F. D.
Bucks,	Watson T. Davis, Ivyland.
Butler,	N. F. Bartley, Euclid.
Cambria,	H. M. Gooderham, Patton, R. F. D. No. 1.
Cameron,	W. H. Howard, Emporium.
Carbon,	R. A. Eroh, Weatherly.
Centre,	John A. Woodward, Howard.
Chester,	Dr. M. E. Conard, Westgrove.
Clarion,	S. X. McClellan, Knox.
Clearfield,	E. M. Davis, Grampian.
Clinton,	Joel A. Herr, Millhall, R. F. D.
Columbia,	A. P. Young, Millville.
Crawford,	J. F. Seavy, Saegerstown.
Cumberland,	T. J. Ferguson, Mechanicsburg.
Dauphin,	S. F. Barber, Harrisburg.
Delaware,	E. J. Durnall, Swarthmore.
Elk,	J. B. Werner, St. Marys.
Erie,	Archie Billings, Edinboro.
Fayette,	Sylvester Duff, Smock.
Forest,	C. A. Randall, Tionesta.
Franklin,	J. P. Young, Marion.
Fulton,	J. L. Patterson, McConnellsburg.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	Geo. G. Hutchison, Warriors Mark.
Indiana,	S. M. McHenry, Indiana.
Jefferson,	Peter B. Cowan, Brookville, R. F. D. No. 4.
Juniata,	Matthew Rodgers, Mexico.
Lackawanna,	Horace Seamans, Factoryville.
Lancaster,	J. Aldus Herr, Lancaster.
Lawrence,	Samuel McCreary, Volant, R. F. D.
Lebanon,	Edwin Shuey, Lickdale.
Lehigh,	P. S. Fenstermaker, Allentown.
Luzerne,	J. E. Hildebrandt, Dallas, R. F. D.
Lycoming,	A. J. Kahler, Hughesville.
McKean,	Dr. Geo. A. Dick, Kane.
Mercer,	Wm. C. Black, Mercer.
Mifflin,	M. M. Naginey, Milroy.

County.	Name and Address of Chairmen.
Monroe,	Randall Bisbing, East Stroudsburg.
Montgomery,	Jason Sexton, North Wales.
Montour,	C. A. Wagner, Ottawa.
Northampton,	Chas. S. Messinger, Tatamy.
Northumberland,	I. A. Eschbach, Milton, R. F. D.
Philadelphia,	J. B. Kirkbride, Bustleton.
Perry,	A. T. Holman, Millerstown.
Pike,	B. F. Killam, Paupack.
Potter,	Horace H. Hall, Ellisburg.
Schuylkill,	W. H. Stout, Pinegrove.
Snyder,	Chas. Miller, Salem.
Somerset,	J. C. Weller, Rockwood.
Sullivan,	E. R. Warburton, Campbellsville.
Susquehanna,	F. A. Davies, Montrose.
Tioga,	E. B. Dorsett, Mansfield.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	Geo. A. Woodside, Sugargrove,
Washington,	D. S. Taylor, Burgettstown, R. F. D.
Wayne,	W. E. Perham, Niagara.
Westmoreland,	M. P. Shoemaker, Greensburg.
Wyoming,	D. A. Knuppenburg, Lake Carey.
York,	G. F. Barnes, Rossville.

LIST OF INSTITUTE LECTURERS FOR SEASON OF 1908-9.

Agee, Prof. Alva, State College, Pa.
Allen, Mrs. Mollie MacClaughry, Oswego, N. Y., R. F. D.
Anderson, H. M., New Park, Pa.
Barclay, Richard D., No. 125 South Front street, Philadelphia, Pa.
Baker, Miss A. C., Chadds Ford, Pa.
Black, Wm. C., Mercer, Pa.
Bond, M. S., Danville, Pa.
Brodhead, Mrs. C. W., Montrose, Pa.
Brodhead, C. W., Montrose, Pa.
Bruckart, J. W., Lititz, Pa.
Campbell, J. T., Hartstown, Pa.
Card, Fred. W., Sylvania, Pa.
Clark, M. N., Claridge, Pa.
Conard, Dr. M. E., Westgrove, Pa.
Cooke, Prof. Wells W., U. S. Dept. of Agriculture, Washington, D. C.
Cox, John W., New Wilmington, Pa.
Callahan, E. E., Wellsboro, Pa.
Drake, W. M. C., Volant, Pa.
Detrich, Dr. J. D., No. 438 Adams Ave., Scranton, Pa.
Eschbach, I. A., Milton, Pa., R. F. D. No. 1.
Fassett, F. H., Meshoppen, Pa.
Funk, Dr. J. H. Boyertown, Pa.
Gooderham, H. M., Patton, Pa., R. F. D. No. 1.
Hall, Horace H., Ellisburg, Pa.
Herr, Joel A., Millhall, R. F. D., Pa.
Hoover, E. S., Lancaster, Pa.
Hull, Geo. E., Transfer, R. F. D., Pa.
Jackson, Homer W., Cambridge, Ohio, R. F. D. No. 1.
Kahler, A. J., Hughesville, Pa.
Klein, Dr. Louis A., Deputy State Veterinarian, Harrisburg, Pa.
Kester, R. P., Grampian, Pa.
Ledy, J. H., Marion, Pa.
Lehman, Amos B., Fayetteville, Pa.
Lighty, L. W., East Berlin, Pa.
Mairs, Prof. T. I., State College, Pa.
McCurdy, Clarence C., Hartstown, Pa.
McDowell, M. S., State College, Pa.
Menges, Prof. Franklin, York, Pa.
Moats, H. E., Jamestown, Pa.
Northup, H. W., Dalton, Pa., R. F. D. No. 1
Owens, Prof. W. G., Lewisburg, Pa.
Peachey, J. H., Belleville, Pa.
Penny, Prof. C. L., State College, Pa.
Philips, T. J., Atglen, Pa.
Phillips, E. L., New Bethlehem, Pa.

Pillsbury, Prof. J. P., State College, Pa.
Posten, B. Monroe, Sheakleyville, Pa.
Rich, Chas. H., Woolrich, Pa.
Ross, A. B., Schellsburg, Pa.
Schwarz, R. F., Analomink, Pa.
Seeds, Robert S., Birmingham, Pa.
Stephens, A. W., Lewisburg, Pa.
Stewart, Prof. J. P., State College, Pa.
Stout, W. H., Pinegrove, Pa.
Thomas, Miss Sara Phillips, Wayne, Pa., R. F. D. No. 1.
VanNorman, Prof. H. E., State College, Pa.
VanNoy, Leon Otice, Troy, Pa., R. F. D., No. 66.
Wagner, F. J., Harrison City, Pa.
Wallace, Mrs. Mary A., Pittsburg, Pa.
Watts, Prof. R. L., State College, Pa.
Watts, D. H., Kerrmoor, Pa.
Waychoff, G. B., Jefferson, Pa.
Weld, R. J., Sugargrove, Pa.
Wilson, Chas. A., Stewartstown, Pa., R. F. D. No. 4.
Wittman, W. Theo., Allentown, Pa.
Wolff, Wm. H., West Chester, Pa.
Wolsieffer, Harry, Buck Hill Falls, Pa.
Woodmand, S. Paul, Rushland, Pa.
Zeigler, Mrs. Sarah B. F., Duncannon, Pa.

MEETING OF THE FARMERS' ANNUAL NORMAL INSTITUTE.

PROGRAM.

First Session convenes Tuesday Afternoon, May 25, 1909.

MR. G. F. BARNES, Rossville, Pa., Chairman.

Call to order 1.30.

Addresses of Welcome, by Mayor Jacob S. Weaver, York, Pa.
Judge Nevin Warner, York, Pa.

Response, by Hon. A. L. Martin, Director of Institutes, Harrisburg, Pa.

1. "MAINTENANCE OF SOIL FERTILITY."
Prof. Franklin Menges, York, Pa.

2. "SOIL MOISTURE."
Prof. Chas. F. Shaw, State College, Pa.

Tuesday Evening, May 25, 1909.

MR. E. J. DURNALL, Swarthmore, Pa., Chairman.

Call to order 7.30.

1. "COMMERCIAL ORCHARDING."
Dr. J. H. Funk, Boyertown, Pa.

2. "MISCIBLE OILS."
Prof. Chas. L. Penny, State College, Pa.

3. "THE MAN AND WOMAN CROP."
H. W. Collingwood, Editor Rural New Yorker, New York City.

Wednesday Morning, May 26, 1909.

MR. HORACE SEAMANS, Factoryville, Pa., Chairman.

Call to order 9.00.

1. "ALFALFA; ITS IMPORTANCE AS A FEEDING AND FERTILIZING CROP FOR PENNSYLVANIA."
Prof. Alva Agee, State College, Pa.

2. "ALFALFA; HOW TO GROW IT SUCCESSFULLY."
J. H. Peachey, Belleville, Pa.

3. "CARE OF MILK."
Dr. M. E. Conard, Westgrove, Pa.

Wednesday Afternoon, May 26, 1909.

MR. JASON SEXTON, North Wales, Pa., Chairman.

Call to order 1.30.

1. "POULTRY KEEPING ON THE FARM."
H. W. Jackson, Cambridge, Ohio, R. F. D.

2. "POULTRY LIGHT FOR THOSE WHO SIT IN DARKNESS."
Chas. T. Cornman, Carlisle, Pa.

3. "POULTRY HOUSE CONSTRUCTION." (Illustrated).
W. Theo. Wittman, Allentown, Pa.

Wednesday Evening, May 26, 1909.

MR. J. ALDUS HERR, Lancaster, Pa., R. F. D., Chairman.

Call to order 7.30.

1. "PROFITABLE SHEEP FARMING."
Joseph E. Wing, Mechanicsburg, Ohio.

2. "STARTING A FLOCK OF SHEEP."
J. S. Burns, Imperial, Pa., R. F. D. No. 1.

3. "BREEDING BEEF CATTLE."
E. S. Bayard, Editor, National Stockman and Farmer, Pittsburg, Penna.

Thursday Morning, May 27, 1909.

HON. H. G. McGOWAN, Geigers Mills, Pa., Chairman.

Call to order 9.00.

1. "THE INDIGESTIBLE PART OF THE RATION FOR A DAIRY COW."
Prof. Wells W. Cooke, U. S. Dept. of Agriculture, Washington, D. C.

2. "HORSE BREEDING FOR THE PENNSYLVANIA FARMER."
Prof. T. I. MAIRS, State College, Pa.

3. "THE DRAFT BREED FROM THE VIEW POINT OF THE PENNSYLVANIA FARMER."
Prof. Carl W. Gay, In charge of Horse Breeding, State Livestock Sanitary Board, Philadelphia, Pa.

Thursday Afternoon, May 27, 1909.

Call to order 1.30.

Mr. E. B. DORSETT, Mansfield, Pa., Chairman.

THIS SESSION WILL BE DEVOTED TO GENERAL DISCUSSION FOR THE DEVELOPMENT OF QUESTIONS RELATING TO THE INSTITUTE WORK THROUGHOUT THE STATE.

Note.—In order to give the greater number of persons an opportunity to be heard, five minutes is allotted to each speaker.

Thursday Evening, May 27, 1909.

MR. J. C. WELLER, Rockwood, Pa., Chairman.

Call to order 7.30.

1. "THE SPLIT ROAD DRAG AND ITS USE FOR DIRT ROADS IN PENNSYLVANIA."

   D. Ward King, Maitland, Mo.

2. "SOIL IMPROVEMENT FOR MARKET GARDENING AND SMALL FRUIT CULTURE."

   Prof. R. L. Watts, State College, Pa.

3. "MARKET GARDENING AND SMALL FRUIT GROWING FOR A PROFIT."

   Hon. R. F. Schwarz, Analomink, Pa.

Friday Morning, May 28, 1909.

MR. A. P. YOUNG, Marion, Pa., Chairman.

Call to order 9.00.

1. "CORN IMPROVEMENT BY SELECTION, BREEDING AND TESTING."

   Prof. Frank D. Gardner, State College, Pa.

2. "TWENTY YEARS EXPERIENCE IN CORN GROWING AND BREEDING.

   L. W. Lighty, East Berlin, Pa.

3. "ORCHARD AND GARDEN INSECTS; HOW TO CONTROL THEM."

   Wm. H. Wolff, West Chester, Pa.

Closing Remarks and Adjournment.

From the register it was seen that the following Institute Managers were present:

County.	Name and Address of Chairmen.
Adams,	A. I. Weidner, Arendtsville.
Armstrong,	S. S. Blyholder, Neale.
Bedford,	David W Lee, Bedford.
Blair,	Howard Cox, Bellwood.
Bucks,	Watson T. Davis, Ivyland.
Butler,	N. F. Bartley, Euclid.
Cambria,	H. M. Gooderham, Patton, R. F. D. No. 1.
Centre,	John A. Woodward, Howard.
Chester,	Dr. M. E. Conard, Westgrove.
Clarion,	S. X. McClellan, Knox.
Clearfield,	E. M. Davis, Grampian.
Clinton,	Joel A. Herr, Millhall, R. F. D.
Columbia,	A. P. Young, Millville.
Crawford,	J. F. Seavy, Saegerstown.
Cumberland,	T. J. Ferguson, Mechanicsburg.
Dauphin,	S. F. Barber, Harrisburg.
Delaware,	E. J. Durnall, Swarthmore.
Erie,	Archie Billings, Edinboro.
Franklin,	J. P. Young, Marion.
Fulton,	J. L. Patterson, McConnellsburg.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	Geo. G. Hutchison, Warriors Mark.
Jefferson,	Peter B. Cowan, Brookville, R. F. D. No. 4.
Juniata,	Matthew Rodgers, Mexico.
Lackawanna,	Horace Seamans, Factoryville.
Lancaster,	J. Aldus Herr, Lancaster.
Lawrence,	Samuel McCreary, Volant, R. F. D.
Lebanon,	Edwin Shuey, Lickdale.
Luzerne,	J. E. Hildebrandt, Dallas, R. F. D.
Lycoming,	A. J. Kahler, Hughesville.
Mercer,	Wm. C. Black, Mercer.
Montgomery,	Jason Sexton, North Wales.
Montour,	C. A. Wagner, Ottawa.
Northampton,	Chas. S. Messinger, Tatamy.
Northumberland,	I. A. Eschbach, Milton, R. F. D.
Perry,	A. T. Holman, Millerstown.
Potter,	Horace H. Hall, Ellisburg.
Schuylkill,	W. H. Stout, Pinegrove.
Somerset,	J. C. Weller, Rockwood.
Sullivan,	E. R. Warburton, Campbellsville.
Susquehanna,	F. A. Davies, Montrose.
Tioga,	E. B. Dorsett, Mansfield.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	Geo. A. Woodside, Westgrove.
Wayne,	W. E. Perham, Niagara.
Westmoreland,	M. P. Shoemaker, Greensburg.
Wyoming,	D. A. Knuppenburg, Lake Carey.
York,	G. F. Barnes, Rossville.

Of the Institute Lecturers, the following were present:

Anderson, H. M., New Park, Pa.
Barclay, Richard D., No. 125 South Front street, Philadelphia, Pa.
Baker, Miss A. C., Chadds Ford, Pa.
Black, Wm. C., Mercer, Pa.
Bond, M. S., Danville, Pa.
Brodhead, Mrs. C. W., Montrose, Pa.
Brodhead, C. W., Montrose, Pa.
Bruckart, J. W., Lititz, Pa.
Campbell, J. T., Hartstown, Pa.
Card, Fred. W., Sylvania, Pa.
Clark, M. N., Claridge, Pa.
Conard, Dr. M. E., Westgrove, Pa.
Cooke, Prof. Wells W., U. S. Dept. of Agriculture, Washington, D. C.
Cox, John W., New Wilmington, Pa.
Callahan, E. E., Wellsboro, Pa.
Drake, W. M. C., Volant, Pa.
Detrich, Dr. J. D., No. 438 Adams Ave., Scranton, Pa.
Eschbach, I. A., Milton, Pa., R. F. D. No. 1.
Fassett, F. H., Meshoppen, Pa.
Funk, Dr. J. H. Boyertown, Pa.
Gooderham, H. M., Patton, Pa., R. F. D. No. 1.
Hall, Horace H., Ellisburg, Pa.
Herr, Joel A., Millhall, R. F. D., Pa.
Hoover, E. S., Lancaster, Pa.
Hull, Geo. E., Transfer, R. F. D., Pa.
Jackson, Homer W., Cambridge, Ohio, R. F. D. No. 1.
Kahler, A. J., Hughesville, Pa.
Klein, Dr. Louis A., Deputy State Veterinarian, Harrisburg, Pa.
Kester, R. P., Crampian, Pa.
Ledy, J. H., Marion, Pa.
Lehman, Amos B., Fayetteville, Pa.
Lighty, L. W., East Berlin, Pa.
Mairs, Prof. T. I., State College, Pa.
McCurdy, Clarence C., Hartstown, Pa.
Menges, Prof. Franklin, York, Pa.
Moats, H. E., Jamestown, Pa.
Northup, H. W., Dalton, Pa., R. F. D. No. 1.
Peachey, J. H., Belleville, Pa.
Penny, Prof. C. L., State College, Pa.
Philips, T. J., Atglen, Pa.
Phillips, E. L., New Bethlehem, Pa.
Posten, B. Monroe, Sheakleyville, Pa.
Rich, Chas. H., Woolrich, Pa.
Ross, A. B., Schellsburg, Pa.
Schwarz, R. F., Analomink, Pa.
Seeds, Robert S., Birmingham, Pa.
Stephens, A. W., Lewisburg, Pa.
Stout, W. H., Pinegrove, Pa.
Thomas, Miss Sara Phillips, Wayne, Pa., R. F. D. No. 1.

VanNoy, Leon Otice, Troy, Pa., R. F. D. No. 66.
Wagner, F. J., Harrison City, Pa.
Watts, Prof. R. L., State College, Pa.
Watts, D. H., Kerrmoor, Pa.
Waychoff, G. B., Jefferson, Pa.
Wilson, Chas. A., Stewartstown, Pa., R. F. D. No. 4.
Wolff, Wm. H., West Chester, Pa.
Woodman, S. Paul, Rushland, Pa.
Zeigler, Mrs. Sarah B. F., Duncannon, Pa.

PROCEEDINGS OF THE FARMERS' ANNUAL NORMAL INSTITUTE, HELD IN THE COURT HOUSE, YORK, PA., MAY 25-28, INCLUSIVE.

Tuesday, May 25th, 1909, 1.30 P. M.

DIRECTOR MARTIN: The hour has arrived when we should take up the program of our Annual Normal Institute. Our afternoon session will be presided over by the County Chairman of York County, Mr. George F. Barnes, who will immediately take the Chair.

MR. BARNES: Gentlemen, and Fellow Members.—We will proceed with the program without any further remarks. First on the program is the address of welcome by the Hon. J. W. Bittinger, Presiding Judge of York county, who will now be introduced to you, and give you the address of welcome.

ADDRESS OF JUDGE BITTINGER.

Mr. Chairman, Members of the Agricultural Association, and Farmers' Institute: I was asked this morning to come here and meet you on this occasion as an official of the county, and express to you a welcome to our midst, in the absence of several officials who expected to do that duty, but who were unexpectedly called away from the city. You will, therefore, have to bear with me in some extemporaneous remarks. I have not been able to prepare anything for this occasion, and will have to depend entirely on extemporaneous speech.

The Farmers' Institute is a thing of great interest. All wealth comes from the earth, which was created for man, who was prepared to enjoy it. All wealth must come from the soil either from the farmer tilling it or from the minerals that are dug out of it and are the means of creating wealth. When it is procured in that way, it is destroyed, while the betterment of life and business and humanity depends upon its preservation. Farming goes back to the earliest history. We read of tillers of the soil before we learn of anything else. In the earliest days the people tilled the soil, and we read of the sections that they opened up. The creating of laws in the interest of any principality was at once applied to the farmers as the creators of wealth. Now, in this country, it has been ever since the beginning of the country, the principal matter. It was the early efforts of the farmers, who cleared out the forests and turned them into farms, that built our schoolhouses and churches and introduced civilization and planted it and sustained it. They have been, since the earliest time, the head of society.

When the farmer is prosperous, every one is prosperous. Everything depends on the prosperity of the farm. When they are secure in their rights, the leaders of the people are secure in their rights and liberties. They are the head of affairs in the United States. They are largely instrumental in placing our rulers in power, and in maintaining our laws, and in having proper laws passed by our Legislatures and Governors, and in seeing them properly administered. They have succeeded largely in advancing their own interests, by a proper interest in their own affairs, and in electing to office the proper men. It was a long time before this force was officially recognized, but eventually it became necessary that the Department of Agriculture should have a formal representation in the Cabinet, in order that the interests of the farmers might be properly conserved by placing a proper man in the place. I have had the pleasure of meeting Secretary Wilson, who has served under four Presidents—three Presidents—McKinley, Roosevelt, and the present Executive. I found him to be a thoroughly practical man, who was not only a farmer by theory, but by practice as well, out in the State of Iowa, where he has large farming interests. He is an excellent example of the right man in the right place, and will, doubtless, if he lives, be called to a higher place. I found him to be not only a thoroughly practical farmer, but a man of wonderful mind in other directions. He was able to repeat from memory all the psalms which he had learned in Scotland when a boy. He is not only a good farmer, but a good Christian. We all feel an interest in farming, and most of us feel an interest in religion. Any man, no matter whether he is manufacturer or farmer, should feel an interest in the religion of his country.

Now, it is a great thing to have such a gathering as this in our midst. You represent the farming interests of this great State of Pennsylvania—the Keystone State. It is a great mining and manufacturing State, but it must not be overlooked that the substrata in Pennsylvania is nevertheless the farming interest. It will remain so. Our great population must be fed and provided for, and this comes from the farm. Everything that tends to benefit the farmer advances the city. It gives me great pleasure to see you here. The Governor is not here, but he is the President of the organization, and you have honorable and responsible men to fill the other offices. You come here from every section of the State, as it appears from the newspaper, which I read this morning, from the far East and the North and the West, and with such an organization you must be a body of great power, and you must congratulate yourselves upon your great work, and the people of York must congratulate themselves that you are here with your wives and your daughters to further the objects of this organization.

Great improvements have been made in the conditions of the farm. We not only have a Department at Washington, but also in the State of Pennsylvania, with proper officers whose duty it is to further the interest of the farm, and the farm home, and the methods of farming of the people engaged in this great enterprise of tilling the soil, and holding the balance of trade in favor of this country. We have not only fed our own people at home, but we largely feed the civilization of the world; our exports largely exceed our imports. Great achievements have been made. There have

been improvements to the tax laws, but they are not yet perfect. There is an impression, often, that by the laws as they are today, there is no tax on real estate, but that is a mistake; the county collects the tax and hands it over to the State. There is room for improvement there. There is room for improvement in the educational laws of this State. Room for improvement in the morality of the citizenship of the State. There has been great improvement in the character of farming, and in the character of the farmer, but there is room for still more improvement. There is room for improvement, also, in many other respects. Equal taxation, as I said, and in legislative matters. Legislatures frequently pass laws that are of no good to the people, and fail to pass laws that would be of vital benefit to them. If we could always send to the Legislature such men as Senator Brown of this county, whom you all remember, there would not be much trouble in that respect. You want to see that proper men are elected to official positions, and then give them a little jogging once in a while after they get there to see that they do their duty. If the farmers make proper demands upon Congress, and upon the Legislature, and upon the Governor, they must be recognized. They are in position to enforce legislation; they have already accomplished much, and with proper and united effort can accomplish much more for the interest of the farm and the home. When you meet in such a body, the people see your strength, and begin to take an interest in your work, and to sympathize with it, and if you attend to your duty at election, and elect the proper men, you will win.

York is a great county; we have fine lands and fertile fields, and intelligent men who till them. These men have intelligent wives to look after their interests, and to see that their children are properly clothed, and get to school and to church on the Sabbath day. The presence of ladies on such an occasion as this shows that they are always ready to do their duty. The world does not suffer for want of proper effort on the part of our better halves. The women are always at the head of every matter of interest, and are always ready to do their best in behalf of every good cause and to suffer, when it is necessary, on behalf of men and women.

Now, I have detained you longer than I intended. I intended to call your attention to the matter of the preservation of the forests. I know you are all interested in that. In these days, when so many places are drying up, we don't want the forests to be cut down. They are being cut down everywhere. People are at work in this county cutting down trees, marking the wood, and so on, and we all know that we must have moist soil to produce the crops, and to have moist soil, we must have trees to conserve the moisture. We cannot afford to have our crops parched, therefore it is necessary for us all to get together and get the public interested in this question of forestry. Of course, there are some trees being planted, but it takes a long time for them to grow up, and they are being destroyed more rapidly than they are being planted.

I have some sympathy with the farmer. I was raised on a farm, and stayed there until I was seventeen years old. Some of you may think that is a very early age to leave the farm, but I have some very distinct recollections of clearing time where young

hickory had been planted. I got a good many kicks on the shins in trying to use the scythe and in plowing; it nearly broke my back to use the scythe, but I could cradle with the rest of them. I remember how I used to have to go through the frosty fields in winter barefooted, until I was glad to stand where the horses stood to warm my feet. I thought it was pretty hard then, and I think so yet, but I often look back and have many times wished that I was still on the farm. I remember the little school two miles away where I got my start in life, and my heart goes back to the old farm.

We have a great city here; we have large manufactories, and markets where the farmers bring their crops. We can congratulate ourselves upon the character of our farmers. We have fine farmers and fine farm lands in our county. I don't say this boastfully, but I think the farmers as a class are prosperous at this time.

I was telling one of my friends at the club the other day that I thought the agriculturists as a class were prosperous, and he told me I was mistaken; the agriculturists were not making any money; the farmers were prosperous enough; the farmers, he explained, were the men who worked with their heads and their hands, and they were making money; but the agriculturists were the men who lived in the city, and let some one else do their farming, and they were not doing so well.

We are a great manufacturing city; we make everything here from a suspender up to the best farm implements which are shipped to all parts of the world. I am told that the very best manufacturers are boys who were raised on the farm and then went to the city. The two interests work together; the farmer brings his crops into the city, and feeds us, and buys the implements that the city makes to facilitate his farming. So this is a mixed community, and there is entire harmony between the farmers and business men. They work in unison. They could not live without each other. At least, they could not live so well. They are prospering and making progress, and in their behalf I extend to this distinguished body a hearty welcome to our county and city on this occasion. We fully appreciate the great honor you have paid us by coming here and discussing your problems, and we hope that while your stay amongst us may be pleasant, our community, in turn, will derive some benefit from your discussions. On behalf of the city and county of York, I extend to you a cordial welcome, and wish you a successful meeting among us.

The CHAIRMAN: The response to this eloquent address of welcome will be made by the Hon. A. L. Martin, Director of Institutes and Deputy Secretary of Agriculture.

RESPONSE OF SECRETARY MARTIN.

Mr. Chairman and Friends: When we received the invitation to hold our Annual Normal Institute in the city of York, I felt confident that we were entering at least into a county that was widely known throughout the State as an up-to-date agricultural county. I also knew that our convention would be held in a city that was known far and wide as a great manufacturing city, a city second to none in the United States as a manufacturer of farm implements, hence we had every reason to believe we would be made

welcome. Indeed, when coming here on the early morning train, we were met at the station and invited to visit certain farms, certain manufacturing plants, and other institutions. And since this session opened, I was personally called upon by the Sheriff of the county and invited into the building on the other side of this room, so that I feel confident, after having listened to this warm and excellent address of welcome, coming from so high a source, speaking in such terms of praise and commendation for the occupation we represent this afternoon, we not only feel doubly welcome but that our occupation has been honored by listening to that address.

And now, my friends, it only remains for me to offer a few scattering remarks relative to the work we represent—the work of this organization. Before doing so, however, it would be doing violence to my feelings should I fail to speak of one or two men with whom I early became acquainted, from the county of York. The gentleman who made the address of welcome referred to the Hon. Jere. Brown. I need only speak that name to recall to other members of the State Board the earnest efforts of the Hon. Jere. Brown to advance agriculture. I met him in the Senate about fifteen years ago; he was then chairman of the County Institutes of York, and I well remember his tireless, vigorous, earnest efforts to elevate the agriculture in the State. In the Legislature he was a power; in the county he was held in high esteem, and in the home life he was an example of the higher and better life.

Sometimes the question comes to my mind: what of the work? What have we accomplished? What one of you acquainted with agriculture in the last two decades but could show me, and mark out the progress accomplished in the last twenty years in agriculture. Do you realize that there has been a revolution in farming in Pennsylvania in the last ten years? But again you ask, what have you done for this progress? The organization you represent today is the one organization that comes face to face with farming in Pennsylvania; that has its sleeves rolled up. It is the burden of our effort to bring to the farmer of Pennsylvania the best methods to adopt in every line of agriculture. How well we have accomplished that can be best shown by turning to the results. The Scriptures tell us, my friends, that "by their fruits ye shall know them." Today, in Pennsylvania, largely as the result of the teachings of this organization of Farmers' Institutes, there are more than ten thousand silos for the more economic feeding of the dairy cow. There have been eliminated from the dairy herds of Pennsylvania more than fifty thousand cows that were unprofitable—largely as the result of the teaching of the Farmers' Institute. There are more than five hundred thousand farmers in Pennsylvania today who are measuring and dividing out the feed of that dairy cow, and studying how she may more economically bring results from that feed. And, my friends, we can go through the entire list of farm proceedings in the same way. The same thing holds true in horticulture. Do you know that in horticulture, growing and pruning trees is revolutionized today—due, I believe, largely to the efforts of my friend here on the left, Dr. Funk, whose book you have read—not altogether, but largely so, and also through the sound teaching that has been preached along this line for the last twenty-five years?

It might be interesting to some of you to know something of the work of the Farmers' Institutes this year, and you will pardon me if I read you just a few figures that are so slow to remain in my mind. They are something to be proud of—our Institute organizations in Pennsylvania—proud of for two or three reasons. This organization brings to the front a number of the best men and women engaged in agriculture all over the State. Our County Chairmen of Institutes—most of you represent this afternoon; I would be proud to have you photographed and placed in the gallery of the best institutions of the world, and your names written there, for your work throughout the counties of Pennsylvania—work done faithfully and voluntarily and without recompense. We have reason to be proud of you. Then, it has been a part of my work for past twelve years to draw from other States, as well as our own, men and women qualified to take up this work and impart methods of instruction in practical and scientific farming to the farmers of the State. We can feel proud that Pennsylvania is provided with a corps of lecturers than whom there is none better in any state in the Union, and constantly, from year to year, have other states, adjoining and farther off, drawn from Pennsylvania their most efficient Institute workers.

And now, my friends, you may be somewhat interested in a few figures. Last year there were held in Pennsylvania 203 institutes—twenty-four one day—one hundred and seventy-two, two day, and seven of three days or more. In these seven of three days or more there were four movable institute schools. These schools were held in McKean, Erie, Crawford, and one other county—Columbia. I want to stop to say a word in regard to these movable schools as an advance institute work. In the town of Bloomsburg, in Columbia County, we started in with one early in the winter, the farmers at the very first session of that school. We held three sessions a day. It was not my privilege to remain the week there, but I learned that at every session there was an increased attendance, and increased interest. Three distinct topics were discussed daily—dairy interests, judging and scoring cattle, the proper feed, and so on, all illustrated; then a session in horticulture, including spraying, grafting, pruning, and so on; then the poultry interest was taken up, and it was an inspiration to see the deep interest manifested by the farmers of Columbia County. The same was true in Crawford, McKean and Erie, and in the city of Erie, with some 70,000 population, the Board of Trade rooms were thrown open to us, and there we had four days of this kind of work, the farmers coming in from all sections of the county, in spite of the severity of the weather in the northwestern part of the State. I simply throw out these thoughts in order that we may develop in Pennsylvania the best means of meeting this demand of the farmer, for demonstration as well as talking. In these institutes of three days or more, we held twenty-three days of meeting during that time. Last year we had an entire number of 982 sessions, at which the total attendance was 156,652. Employed in this work were 73 State lecturers, and 221 local lecturers.

Permit me to say a word in reference to these local institute lectures, in which the local organization where these institutes are to be held, and the people of the county and vicinity are always

invited to go on the platform and take part in the discussion, and read papers, and joint with the State lecturers in developing this great question. Now, in order to bring to your mind how these local people help us, I would say that we had 221 local lecturers who volunteered to help our State lecturers. The total cost of holding these institutes, which includes car-fare, hotel bills, hall hire, etc., was $38 per day for the entire season. Indeed, my friends, that little report shows better than in any other state in the Union. Just here I want to say something and commend a little. In many of the counties of the State the people were so anxious to have these meetings that they threw open their churches to us and practically all the cost to us, except for light and heat, was a slight remuneration for the janitor. Indeed, if it had not been for the liberality of the members in many of the counties of the State we would have been without a place of meeting in some of the smaller places where they have no halls. And I may say that our effort has been to help sustain the teaching, and the character on the part of the instructors that will comport in moral standing with the highest ideal. Especially does this apply to the farming people of Pennsylvania and their churches. Are they not sustained, and do they not receive their support, as well as largely their spiritual strength, from the men who are engaged in farming in their midst. Why should they not open their house of worship for this great work of agricultural education and advancement?

Besides these regular institutes, we had a number of independent institutes—some fifteen were held in the State for which we supplied one or more lecturers, and at which the total attendance was 29,000. At our last Normal Institute 1900 were in attendance, so that we have had for the entire year ending with the round-up meeting for 1909, a total attendance at our institutes of 187,550 people.

We have in Pennsylvania about a million people interested in agriculture. We have not reached them all yet. Indeed, my friends, there are people in every county of the State asking for institutes, which we have neither the means nor the power to supply at this time, although the legislature has given us careful consideration in the way of appropriations. It is very rarely, indeed, that we have gone before that body, and asked for an increased appropriation that it has not been granted us. We have not been restricted. During the last session of the Legislature, we intended to ask an increase of $10,000, indeed, your Resolutions for the past two years were to that effect. In appearing before these Legislative bodies—and I want to commend our good Secretary to the right who opened the way for me to appear before these bodies and state the case. Through the efforts of those interested, the Legislature increased our appropriation, making it $45,000 for two years, or $23,500 per year to help us in our great Institute work.

Now, my friends, I have already talked too long. I am satisfied that every one of you here fully appreciate your opportunities, and the importance of the work in which you are engaged. We have to meet the farmers of Pennsylvania on their own ground; it is our work to advise them how to increase their acreage, and the average yield of their crops; how to make the best use of the best methods. Before I take my seat may I call your attention to just one or two of the products of Pennsylvania. You know there are many people

who say that Pennsylvania is a great manufacturing state—the greatest manufacturing state in the Union. And so it is. She is the greatest mining state in the Union, but she is, at the same time, one of the greatest farming states. In order to bring this matter to your mind more forcibly, let me give you some statistics. It is a part of my work to tabulate the farm products and their selling prices in Pennsylvania. Very interesting they are, but I have only time to give you one or two of them before I take my seat. Now last year Pennsylvania raised of

	Acres.	Bushels.	Price.
Potatoes,	261,000	22,968,000	$15,389,000
Wheat,	1,618,000	30,095,000	28,891,000
Corn,	1,413,000	45,922,000	29,390,000

The point to which I want to call your attention is this; we had a great potato crop last year, but how many farmers, do you suppose, raised 200 bushels to the acre? Or even 100? No; no. If I were to ask you how many of you raised 100 bushels, I might get some answers, because you are Farmers' Institute men, but what was the average? Just 88 bushels per acre, and Pennsylvania is not a great potato state, either. The average farmer in Pennsylvania is a mighty poor farmer. How many of you could easily have raised ten more bushels per acre; you could do that, and if you increased your bushels from 80 to 90, it would make a difference of $18,392.00 dollars. Now, to what end is the Farmers' Institute of Pensylvania devoted? It should be devoted to teaching the farmer—that is the average farmer; he is the fellow you want to reach—the methods of selecting his seed, of preparing the soil, of cultivating that land, so that instead of 88 bushels per acre, he will have 150 bushels; there is nothing extraordinary about that. Many are growing 300 bushels per acre, and then they wonder what the other fellow must be growing to bring the average only 88 bushels. What we want to do is to awaken the mind of the sluggish farmer of the State, and get him to thinking, and to working along improved lines; get him interested in the Institute; he is the man we are trying to reach.

The same thing holds true of corn; we are a splendid corn state; we grow 4 bushels per acre more than the leading corn growing states in the Union, but even then, my friends, how many bushels to the acre do you grow? How many do you fellows in York County grow? You grow splendid corn here, but how many bushels do you grow to the acre? Less than thirty-eight bushels per acre! Now, just a little raise up to forty bushels will raise the average. We cannot expect to largely increase that average yield in one, three, or even five years, but by constant improvement, raising the average a little at a time, we can raise the average yield of Pennsylvania up to 50 bushels per acre without any trouble. To this end the members of this organization go out and meet the farmer

face to face, and look him in the eye, and stand shoulder to shoulder, working for the best method of developing a higher standard of agriculture in Pennsylvania—the best method of increasing the working power of the farm; the farmer has to make his living out of it, these are vital, living questions to him. My fellow-farmers! the Institutes of Pennsylvania stand for investigation and development. Time will not permit me to speak of the great educational force that is now at work, working out and leavening for the farmer of Pennsylvania some of the problems that confront him. Normal schools were organized for preparing teachers, to which we have the right to look for the development of our young men and women, and they are now waking up at the eleventh hour. Thank the Lord for that even if it is at the eleventh hour. Some of them are beginning to place in their course of study, agriculture and agriculture will keep its place in the front rank by reason of its importance. Up to this time the boys and girls who are going to run our farms have only had occasion to develop their minds along the lines of commercial enterprise, soil and mineralogy, and botany and chemistry, as applied to the soil, were all neglected. But agriculture is now coming into its own. All sections of the State are now looking in that direction, and we shall turn out farmers and fit our boys and girls to take our places in the field when we lay down our work in these Farmers' Institutes.

The CHAIRMAN: Before we proceed with any further business, I would state that we have received certificates of the following gentlemen as delegates from the York County Agricultural Society and the Logansville Farmers' Club: Mr. D. B. Goodling of the York County Agriculture Society, and Mr. E. B. Goodling of the Logansville Farmers' Club. I suppose the next thing in order would be a motion to give them the privilege of the floor.

MR. BLYHOLDER: I move that they be given the privilege of the floor.

MR. HUTCHISON: I second that motion.

This motion was duly carried in the regular way, and the privileges of the floor extended to these delegates.

SECRETARY MARTIN: I wish to say that it is our desire that all delegates and visitors present shall register, so that we may have a record of the attendance. By this means you become a member of the organization for the time being, and this gives the Department the means of corresponding with you in the future relative to the working out of certain questions that may come up.

SCERETARY CRITCHFIELD: Mr Chairman, I move you, sir, that all persons who meet with us be invited to sit in our councils and be given the privilege of the floor.

SECRETARY MARTIN: I second that motion.

This motion was carried in the regular way, and all persons present given the privilege of the floor.

The CHAIRMAN: Next in order is the next number on the program "The Maintenance of Soil Fertility" by Prof. Franklin Menges. Prof. Menges will now address us.

Prof. Menges' address was as follows:

SOIL CONSERVATION OR NATURE'S METHOD OF MAINTAINING SOIL FERTILITY.

By FRANKLIN MENGES, PH. D., York, Pa.

Soil conservation, or the maintenance of soil fertility, is the foremost question of the day, and the best way to maintain this fertility should be made so prominent by Farmers' Institute Lecturers, by Agricultural Experiment Stations, and National and State Departments of Agriculture, that the farmer will awaken to see its importance, and be induced to introduce methods by means of which this fertility can be maintained, and to demand both National and State legislation of such a character, that this one National resource, of all resources the most important, shall be handed down to posterity for the perpetuation of the states and nation, unsullied in any of its capacities.

The maintenance of soil fertility is, therefore, a National question. While it did not receive the consideration and occupy the foremost position, as in my humble opinion it should have done, at the National Conservation Conference, called at Washington, May 13th to the 15th, 1908, by President Roosevelt, for the consideration of feasible methods for the preservation of our National resources, yet there was at least one member of that conference who was far-sighted enough to see that the maintenance of the fertility of our soils was "the issue of National existence."

Men must be taught to realize their duty to coming generations. In a monarchy, the conservation movement may be the dictum of one individual, or the policy of an autocracy, but in a Republic like ours, it must be made the policy of the whole people. Do the people realize, or do the farmers see, that the fertility they are now consuming, and not returning to the soil, came to them from the hands of nature, built up through ages of time, which became more fertile, the longer she kept on building? And do the people see that man has come in, and has arrayed himself against the processes of nature, and has become an agent of destruction, instead of an agent of construction? With natures' method of crop production she developed soils that became so fertile that they were capable of producing such crops that it was no longer a question for these crops to obtain fertility from the soil, but sunlight, and only those that had developed the power to raise their heads above their competitors into the eternal ocean of sunlight could survive. But not satisfied with this attainment, nature produced the shade-enduring varieties of trees and bushes, and in large areas of our forests, we have the towering oak, and the undergrowth into which hardly a ray of sunlight penetrates.

Nature's Method of Soil Production.

In the words of another, I want to say "Earth is a potential forest." Given time, freedom from geological revolutions, and from interference by man, tree growth must finally dominate every thing, with but few exceptions. The causes of this domination of tree growth are their perennial nature, their height above all other vegetation, their remarkable recuperative powers, their annual production of reproductive seed and spores, but still more, the production of the annual ring of new wood in stem expansion and root development for feeding this new wood. The central part of the tree may decay, but so long as the annual ring is added, unless something else interferes, the tree survives, and under these conditions, it seems it would never die of old age. This endowment of self preservation and perpetuation seems to have characterized forest growth during the geologic ages, in which the earth supported life, because it seems that forests had then gained possession of the earth's surface.

Already during the Devonian age, when but a small part of the continent had emerged, the mud flats and sand reefs became clad with pioneer forests, composed of tree rushes, Calamites, Lepidodendrons, Sigillaria and the prototype of our pine, the Dadoxylon. During the Carboniferous age, when there must already have been a good soil, these and many other forms, became more numerous, and likely spread over all the land and formed our coal beds. During subsequent geological ages many floral types vanished completely, and others of a higher character appeared, until there were species adapted to all sorts of conditions, capable of climbing the steep mountain sides and covering the land with forests to the poles. In more recent times came the leveling process and the period of glaciation, which introduced such climatic changes that only the hardier races survived, and these were driven south in a rout.

When this glacial winter receded, the hardier species of the pre-glacial forest which had been so precipituously driven south, again made battle for possession of the soil and followed the northward movement of the receding glacier until the forest again covered the earth to glacial limits.

The forests which at one time covered this country from Maine to the Gulf, and well-nigh from the Atlantic to the Pacific, was the result of the last struggle.

With this virgin forest, the creation of long-continued evolutionary changes in species, changes in the surface of the earth, changes in climatic conditions, changes by volcanic eruptions, nature handed over a soil to man, when the world was ready for his occupancy, which she had created out of disintegrated rock and organic matter, a soil that was capable of producing larger and larger crops as ages passed on. As the forest contested for, and finally gained complete possession of the soil during geologic ages, so does it become the victor to-day, unless interfered with by the hand of man.

As during early geologic ages, when but small areas of land existed, only the lower forms of plant life could thrive, so to-day on the naked, but partially water decomposed surface of the rock,

and on the coarse stony mountain sides, and on the rounded gravels and selicious sandy deposits or rivers and oceans, as well as on the hot, dry plains, the preliminary work of the lower vegetation, such as the algaes, the lichens, the mosses, the grasses, herbs and shrubs proceed to cultivate the naked rock and stony mountain side and coarse gravel and selicious sands of rivers and oceans, and lay down their bodies a sacrifice on the altar of soil creation.

By this sacrifice of themselves these pioneer soil makers through centuries of time accumulated sufficient depth of soil for the first tree formers to appear.

In the Appalachian Mountain system, the members of the Heath family, such as the Laurel, the Rhododendron, the Ground Laurel, the Trailing Arbutus, are the first tree forms to appear. After these comes the Viburnum, then the Wild Cherry, all of which to-day, where the forests have been cut and burned away, again and again, strive to cover the parched hill and mountain side, with grateful shade, which the greed, the avarice, the visciousness of man denuded and scaled. Along the water courses i nthis section the alders and willows soon take possession and where the soil has accumulated to sufficient depth, they become so persistent as to crowd even the flowing water into narrower channels and hold up the soil that comes down from the hill and mountain sides. Following these pioneer trees come the pine and spruce, satisfied with the scanty soil and soil moisture of the mountain sides, while in still higher, colder and wetter elevations, the fir, sometimes much stunted by the rigor of its environment, thrives.

These trees, with their congenial shade, prevent the evaporation of water from the scanty soil, and their falling and decaying foliage increases the soil depth, helps the decomposition of the rock, and greatly increases the water-holding capacity of the shallow soil. After the pines and spruces came the birch, the maple, the elm, and the ash, and in the moister and more fertile places, the oak—first the chestnut oak, then the black oak, and a little later the white oak, and the assiduous hickory, and the beeches and other shade enduring species. All of these have worked together century after century, creating a foot of soil during every three to five hundred years, by the decay of leaves, branches, and the bodies of those that have fallen by the way in the intense struggle. In this way a soil of such depth and fertility was produced, that the contention of the trees was no longer one for fertility, but a struggle for sunlight.

Atmospheric Disintegration of Rock.

The atmospheric disintegration of rock has already been referred to. It is supposed if the formation of the soil depended entirely on this method of production, that a foot of soil would be made in about ten thousand years, or a soil four feet deep made in this way would require forty thousand years. If this is true, then the decomposition of the rock and stones in our soils must proceed very slowly, and the mineral fertility these contain made available in exceedingly small quantities. But where the two are combined, the forest and the atmospheric agencies, the one taking the mineral fertility out of the soil as it is made available, as well as helping to make it available, and combining it with the carbon and oxygen

of the air into organic structures which die and decay, and both the mineral and organic matter these contain go into the soil. In this way, as has been pretty well demonstrated by observations in the Adirondack mountain forests, a foot of soil is deposited in from three to five hundred years.

In our soils, therefore, we have presented to us a gift, the product of a marvellous system of construction, in which nature has used her creatures, beginning with the solvent agencies of water on the bare rock, then with organic life, the algae, the lichens, the mosses, the grasses, the pioneer trees, and the pines and spruces, the birch, the maple, the elm, and the oak, and produced a soil with ever-increasing fertility that knows no exhaustion.

Destruction.

Man now comes on the stage, and takes sides against the forests, and contends for the use of the soil, for the production of the crops needed for the support of himself and those dependent upon him, as well as for the use of the wood for the construction of his dwelling and the many thousand purposes to which it can be applied. A legitimate contention, had it stopped here, but when the crop yields from this virgin soil came, and the markets for these opened, and the many uses for wood in the arts developed, it so sharpened the appetite of man's avarice that he resorted to wanton destruction of the forests, instead of their legitimate use. But what is still worse, he has so interfered with the processes of nature that he set in operation the destruction of that instrumentality, with the exception of the soul and mind of man, the most important, the God-given soil, which under the constructive hand of nature required thousands of years to bring into existence. This he has brought about by parching the denuded mountain and hill-sides again and again with fire and thus destroying the pioneer soil-makers and handed over the naked rock and soil to the action of wind and water. He has dried up the bubbling spring at the foot of hills and mountains, and has deprived the streams and rivers, as well as the agriculture of the plains, of a constant water supply, which the forest-covered hills and mountains alone can provide. Within historic times in the mountain districts of France, by the wanton destruction of the forests, by the fire brand and browsing cattle, the soils were so despoiled of their vegetation and their vegetable matter that to-day only the bare rock stands out in the burning sun, where once luxuriant forests grew. But with the removal of the soil of the mountains by the torrents of rain, came the covering over of the fertile plains of many thousand toiling farmers.

To-day, in order to prevent the further covering up of the fertile fields of these plains, an effort is made to reforest these bare mountain sides by building facines and stone walls and changing the course of the mountain streams into a succession of gentle slopes and by carrying soil to the mountain tops and planting quickly sprouting and growing trees to create natural barriers to prevent washing, and on the bare rock make a new soil through the same agency by which nature made soils at the first. Centuries of time will pass on before a new soil will again be built up on

these naked mountain sides. The question naturally arises, can man be a conservator of the soil?

Conservation.

Looking at nature's methods for suggestion for soil conservation, we notice that we still have about all the plant life that helped to create the soil, adapted to all the functions that called it into existence. But these do not provide food, and with the exception of the forests do not bring a monetary return to the farmer. Forests have been a wonderful agent in construction and still are, and are valuable as well, and their preservation must be demanded by the people, whether lumber is on the free list or not. The higher elevations, from whence washing begins, must be re-forested in a systematic way. It may be objected that the forest trees do not supply the necessaries of life, and there is not enough rolling and level land upon which to raise the cereals needed to supply the demands of the people.

To meet this demand, and at the same time conserve the soil, nature has provided many forms of nut and fruit trees, and berry bearing bushes and vines, as well adapted to soil creation and conservation as the forests, and which, if they had been brought under cultivation as have the cereals, would be as desirable as food for man. It is to be hoped that they will be brought under cultivation and that the Scientific Experts of our Experiment Stations and our National and State Departments of Agriculture, by modern methods of cross-pollenation, fertilization and selection, may evolve nuts and fruits that can be raised on hill and mountain sides, which shall be as well adapted to supply the needs of the human body as are the cereal grains, and which can be made to yield larger returns than the grains.

The Farmer as a Conservator.

It was through the agency of leaves, largely, of the forest trees, that the two principal substances that make up the soil were brought together. The leaf extracted from the air the carbonic acid, elaborated from it the substances out of which wood is made. The leaf withered and died, and fell to the ground and added its body to the soil, and finally the tree did the same. This same cycle is going on on the farm, and as nature by a similar cycle has built soils that became richer and richer, so should the farmer. The question naturally comes up, how can the average farmer make a living off his farm, and at the same time increase the fertility of his soil? If there is one man who is trying to do something for that average farmer, I am at least trying to be that man. It seems to me, that average farmers should be made to know something of the long time required to construct such a soil as he is farming; how it came into existence; that it is composed of disintegrated rock and organic matter; that the organic matter is being obtained from the air, through the agencies of the leaves of the plants he produces, and that the wasting of this organic matter, or the burning out, or farming out the organic matter, is the main cause of the decrease of the fertility of his soils.

Get the farmer to see this, and see it clearly, then whether he be only the old line grain farmer, or the dairy and grain farmer,

he can be induced to adopt means of getting, taking care of, and applying this organic matter without changing his rotation. Some one says there is nothing in rotations; that may or may not be true; but I am dealing with a man who is married to his rotation from his youth, like a Chinaman, and cannot be divorced.

The Old Rotation and Conservation.

Just as an illustration, and also because we are in a section where the old rotation of grass and then corn, and then oats, or more recently, wheat or corn a second time, and then wheat, and then back to grass, is well nigh universally followed.

I have in mind several farmers living not a hundred miles from this place who were unwilling to change the old rotation, but who fully understand the importance of keeping up this organic matter in their soils. These farmers applied the manure to the soil directly as it was made, so that there was no loss there in organic matter or fertility. Beginning with corn in this rotation, crimson clover is sown at the last cultivation, which at the present time, after a practice of this sort of a number of years, always catches and winters all right. The crimson clover is plowed down in the spring and the ground sown with oats. Sometimes part of the field is planted with corn a second time, which gives the crimson clover a longer season to grow. With the oats is sown one of the clovers, either Red, Alsike, Mammoth, and Crimson has been used, depending somewhat on the price of seed. The growth of these clovers is such after some years of this kind of practice, that they interfere with the harvesting of the oats, as well as the drying. The clover is plowed down sometime after the middle of August, and the soil prepared for wheat. No grass seed is sown this time but in the spring, some time in April, red clover is sown into the wheat. The clover seed is covered by running a weeder over the ground, which does not injure the wheat. After the wheat is harvested, the clover has possession of the soil, and this soil, by the raising of these clovers has become so fertile, that a crop of clover hay is harvested early in September, the clover sod plowed down, the field sown with rye and winter vetches, which are plowed down the following spring, and the field planted with corn. The rotation has been shortened one year, and with every crop produced, a crop of clover was raised and plowed down, and the only additional work and expense has been one plowing and the clover seed.

A farmer who has worked out a scheme like this will not stop here. He has now come into harmony with nature. He is constructive in his methods, and must make a living at the same time. He sees that nature has made the animal to feed on the land, and he has observed that the fertility of the soil can be maintained by feeding the crops raised on the soil to animals, return the excreta directly to the soil, and sell the animal or its products. Instead of plowing down the rye and winter vetch, he cuts them, silos them, or feeds them as soiling crops. Instead of selling the corn, he feeds it to cattle or dairy cows with the rye and winter vetch roughage. He feeds the oats also. Instead of selling the wheat, he goes into the co-operative movement, gets it ground, sells

the flour, which contains the least fertility, directly to the consumers, keeps the bran and middlings and feeds these with the corn to balance the ration.

He is not a big fish, but simply the average farmer, who has come into harmony with the processes of nature, and is working along the lines to establish a permanent agriculture.

Commercial Fertilizers.

There are some soils, which, even through all the organic matter they produce, and the fertility it contains, is returned to them, are naturally so deficient in one or two of the elements of fertility, that an application of these elements pays. The farmer who works for a permanent agriculture, will be so well acquainted with his soil, that he will use only that element in which he knows his soil is deficient, which will be one or both, Potash and Phosphoric Acid; for the Nitrogen he will have the clovers and the Nitrogen absorbing bacteria in the soil procure for him from the air. This farmer has observed that soils which contain a large amount of organic matter and a fair quantity of Corbonate of Lime, and have a slight protection of organic matter, or a growth of the green-blue algae, become richer in nitrogen even if there are no clovers growing upon them.

Hall observed in two fields at Rothamstead, abandoned to themselves for twenty-two years, that the one, the Broadbalk field, rich in organic matter and Carbonate of Lime, gained 100 pounds of nitrogen annually, while the other, the Greencroft field, not so rich in Carbonate of Lime, gained twenty-five pounds per annum. The farmer who works for a permanent agriculture, or for soil conservation, does not only employ the leaves of the plants to obtain organic matter from the air to keep up soil construction, but he creates a congenial environment in that soil for the development of beneficial bacterial life, as well as for the maintenance of soil moisture for the dissolving of soil fertility, as well as to bring from depth beyond the reach of the plant root, by capillary action, the fertility washed, or made available there.

The CHAIRMAN: If any of you have questions on Prof. Menges' paper, you will write them out and hand them in after the next speaker is through.

I now have the pleasure of introducing to you the next speaker on the program, Prof. Charles F. Shaw, of State College.

Prof. Shaw made the following address:

SOIL MOISTURE.

By PROF. CHARLES F. SHAW, State College, Pa.

I have just come from Washington, where I have been with a class of students, and I am very tired, but I will try to talk to you a little while on "Soil Moisture."

Soil moisture is closely related to soil fertility, on which you have just heard such an excellent address. Now, the plant must take its food in the form of a solution. It cannot take solid food;

it must have liquid food. It must have water in such a form that it can take it up. Now, the importance of soil fertility and soil moisture can be seen, when we consider for a moment the amount of money that our Government is spending in the reclamation service,—in digging canals and ditches for irrigation, and when the water is put on that land, they have a regular paradise, instead of the dry sage-brush they had before. The soil is there, and the plant food is there, but there is no moisture in the soil, and the plant cannot thrive. In the semi-arid regions of Western Kansas, Texas and the Dakotas, the farmers cultivate their land only once every two years in order to get one crop—in order that they may have sufficient moisture to grow one crop. But if we consider the matter of our drouths and the loss of moisture, and consequent loss of crops, we will find that this subject of soil moisture is just as important to the Pennsylvania farmer, as it is to the farmers of the semi-arid regions of the West. Every year they lose a large amount of their crops through these small drouths that come once or twice or three times in a season, and that loss is greater than the loss that comes through the great drouths that come once every four, five, six, or ten years.

In the United States there were in 1908 approximately 100,000,000 acres of corn. Now, it would not take very much drouth to cut down the yield one bushel per acre, but if we do that, we cut it down for the country, 100,000,000 bushels, at, say 50 cents per bushel. That bushel per acre would reduce the money in the farmers' pockets in Pennsylvania $70,600 in one year, and the farmers could not afford that. Now, if the land was properly cultivated, that water could be saved and used.

Water in the soil has three great uses; it is first, a plant food; and the first chart I will show you gives you the percentage of water in the different plants, and shows you the amount of water that goes into them:

Timothy (green), 70 per cent water.
Timothy (dry hay), 14 per cent. water.
Clover (green), 80 per cent. water.
Clover (dry hay), 16 per cent. water.
Alfalfa (green), 74 per cent. water.
Alfalfa (dry hay), 16 per cent. water.
Potatoes (in tubes and roots), 75 per cent. water.
Potatoes (in the leaves and stems), 90 per cent. water.
Apples and pears, 83 per cent. water.
Strawberries, 90 per cent. water.

That shows you the amount of water that is needed for food. That grows into the plant just the same as the water in our own bodies does, as a part of our being.

Now, that is the first use. The second use is as a dissolver of plant food. As I said before, the food must be dissolved in order to get into the plant.

The third use: We must have water to carry that food up into the leaves of the plant, where it can be used. The water is also needed there in the little cells to keep the plant turgid and stiff. When the plant begins to wilt, the water is leaving the cell. In the

ease of corn, the cells on the inside of the leaf begin to evaporate more rapidly; when the leaves begin to curl up, they reduce the evaporation by one half, so that when the corn leaf is curled up, it is trying to save moisture.

Now, the water can only come from one source. It comes down by precipitation in the form of rain. The water is drawn up from our great rivers, from our soils, and from the oceans, and then precipitated in the form of rain. Our average rainfall in Pennsylvania is about 40 inches annually. It varies from 43 inches in south Bedford Co.; to as little as 32 inches in some of the other counties. That is about 4,560 tons of water on each area. Now that 4,560 tons of water has to supply the springs, supply the plants, supply every demand for water except right down on the sea coast where it seeps into the ground. The water that flows down the surface and washes away the soil should be reduced to a minimum. That can be done by surface tillage; have the land plowed and harrowed and the soil kept loose. I had the boys in my class prepare two cans, in one of which they packed the soil down hard, and in the other they just harrowed it and left loose, and we found that the loose soil will absorb eight times as much water as the other. Now, if you keep your soil in a hard condition, you will lose one-half your water. If you have land that slopes, it will pay you to plow round the hill and leave a ridge of sod occasionally to prevent the water from running out. I am talking about soils that wash away, thus reducing the value of the farm. I know of one case where a field on the east side of the hill had been used as a cherry orchard for years, but after reading the agricultural papers, the farmer decided it might be well to plow it, and he did so for about four years. One day he noticed a peculiar mark on his trees. He looked at it, and found it was the old soil mark, showing where the soil had washed away. So he went back to the sod. Watch the washing on your hillsides in order to prevent it.

Now, more of the water will pass down through the ground into the reservoir there. You may have to go down 12 feet, or you may have to go down two hundred feet before you find what you want, but when you get down to it, that is the ground water level. It is the water that comes down through the ground and collects in the reservoir that is of value to the plant, because some of it comes back to the surface by what is known as capillary attraction. This simply means that it passes up through the soil as the oil passes up through the wick of the lamp. You don't speak to the farmers about the capillary tubes. That is not the right term. They are simply very fine grains of soil, which will take up the water as they come in contact with it. That is capillary film. It is simply a little layer of water on the outside of this soil grain, which by surface tension tends to lift more water up until it reaches the particular point where the soil can hold it by proper action. By this means the water is raised to the surface, and there made to evaporte, and used by the plants.

Now, the water that comes into this water reservoir may be lost in three ways; first, by slow drainage; second, through the plant, and third, through the air. Now, that which goes through the plant is beneficial to it, but the last is actually harmful. In

this chart I will give you the amount of water that is removed by the soil in growing these crops that are shown. This work was done in Iowa, about 1895. It very clearly demonstrated the amount of water in each foot of soil, to a depth of 6 feet, through a period of thirty weeks. The crops were growing all during that period. During that period about 25.8 inches of rain fell. There was very little surface run-off. The rains were slow and gentle rains, and, according to that bulletin, practically all of them ran down into the soil. Now, we found that one ton of clover hay took out 1,560 tons of water, or the equivalent of 13 inches of rain-fall. (You remember that I said in Pennsylvania we get about 4,500 tons of rain-fall.) Corn fodder took out, for one ton, 1.7 inches of water, equivalent to 15 inches of rain-fall. One ton of oats, 1,200 tons of water, or the equivalent to 11 inches of rain-fall. Two hundred bushels of potatoes required about 280 tons of water, or about 5.6 inches of rain-fall, and one acre of pasture land took out 3,383 tons of water, or about 28 inches of rain-fall. Now, that was ordinary blue grass pasture, which never got very thick, and never grew very thin. Up there we have only about 32 inches of rain-fall, so that it would take about all we can get to keep up our pastures.

Now, the rise by capillary attraction is shown on this chart. It does not show off very well, but it shows the heighth to which water rises in inches. I show you this in order to show you that different kinds of soil have different degrees of capillary power. The sand receives it very rapidly, and draws it from the reservoir very fast, the first few hours; during the first half hour it raised up 3 inches, while during a period of twenty-four hours, it only raised up all told 6 inches. Sand will raise the water very rapidly during the time it can raise it, but the grains are so large that we have no small films and, consequently, no power to draw it very high.

Sandy loam raised it about 25 inches; loam still higher, and silt loam higher still—up to 28 inches, but it was slow in getting it. Silt loam can raise it very high. The rise would be aided by the rain coming down and covering these soil grains with moisture, but in this case the work was done very slowly by capillary attraction only.

MR. SCHWARZ: Have you any idea what clay will do?

PROF. SHAW: I did not use clay, because I could not get any good clay. It will raise it higher than these. In silt loam the water has to squeeze through very little openings. Silt is about the size of ordinary flour. Limestone soil is the best thing for the capillary raising of water.

Now, the water that comes from the surface, and does not enter into our plants and become a part of their life, disappears through evaporation, and is lost to our farms. In the case of water which is passing through the soil, what is not taken up by the plant is evaporated, and this evaporation, in our garden soils, cool the soil.

It takes 600 calories of heat to evaporate one unit of water. The amount of heat necessary to warm one pound of water is 600 calories. If you put your corn or oats in the ground in the spring, and want them to sprout quickly, you want to prevent the moisture from evaporating. The evaporation from the soil would easily retard the sprouting two or three days. If you could drain that soil, and mulch it, you can get very much quicker results.

Now, the prevention of evaporation is done by mulching. You allow the first three or four inches of soil that you turn up to dry up, and that dry soil will not let the moisture rise rapidly. If you cultivate once a week or ten days, or in the very best soils, once in two weeks you can keep that surface soil dry enough to prevent evaporation. You want to keep on that surface about three inches of dry soil; the water cannot go through that very readily, and you will thus prevent evaporation.

Now, if you are growing vegetable garden crops—strawberries, &c., in order to conserve the moisture you may want to make a mulch of straw and leaves. In our experiments we found that the least loss came from the leaf mulch; the next from cultivating the soil, and the greatest loss from the bare soil. We lost 83 per cent. with no mulch; 56 per cent. by cultivation, and only 32 per cent. by the use of straw and leaves.

Now, the only thing that you can do to save the water is to cultivate. Cultivation is a very small matter. You have to cultivate to keep the soil in proper condition to grow your crops, but cultivate frequently, and advise your neighbors to cultivate often, and you will have no trouble in growing that extra bushel of corn, which will net the farmers of this State the $70,000 that is lost annually through lack of proper cultivation of the soil.

MR. SCHWARZ: Now the water comes from 6 feet under the soil. Could it come higher than the 22 inches you have there?

PROF. SHAW: Yes, in ordinary soils. The rain water will help the capillary action of the soil grains and raise water above six feet.

MR. HUTCHISON: Why do trees and plants grow on limestone soil with only four to six feet of soil.

PROF. SHAW: Because limestone soil is the very best kind of soil to draw this water up, and also holds water better than any other kind I know. Last fall, when we had only slight rains, I could get moist soil in our limestone clay up at the College at a depth of six inches, when I could not get it anywhere else.

PROF. SURFACE: Would the addition of lime to a good, healthy soil help to hold the water there?

PROF. SHAW: It may help the soil in other ways, but I don't think it would help to hold the water there.

A Member: Would a mulch of one or two inches on the grain help to hold the moisture?

PROF. SHAW: I believe that in the case of oats or wheat or grass a soil mulch would help to conserve the moisture, and prevent evaporation. At Cornell they tried this experiment: They tried oats and wheat in the ordinary way, and they also tried cultivating them by putting two rows together, but while they got a higher yield by cultivation, there was less profit on it. I believe, however, if you went over the oats at the present time, you would hardly injure the heads. They are too little yet to be injured.

MR. BOND: I would suggest that you cross the field diagonally; you will be surprised to find how few plants are destroyed.

MR. HERR: I would like to ask the Professor whether rolling the ground before the sowing is finished has a tendency to conserve moisture or not.

PROF. SHAW: That necessarily depends upon the conditions. Where the soil is dry, rolling the oat ground would be good because it would cause the water to come up more rapidly, but it would not tend to conserve the water. It would tend to help the films form a little faster. In my own farm practice, before I left farming, I did not believe it wise to roll any grain crop unless I intended to go through with a harrow or weeder and make a mulch. Does that answer the question?

MR. HERR: I was passing through Columbia county a week or two ago, and I saw a man rolling his oat ground; I do not consider it a very good practice, but I suggested to take a harrow and go over it, and then compare the two, and I am sure he would decide in favor of the harrow.

MR. HUTCHISON: Would it not be well to roll it if you want it to sprout quicker?

PROF. SHAW: Probably it would. After you have harrowed your wheat, it might be well to roll, because the moisture that is brought up would help it sprout quicker.

MR. SCHWARZ: If the blades and leaves tend to hold the moisture in the soil, how do you account for the production lost in pasture land?

PROF. SHAW: The pasture land was browsed by cattle all the time, which helped to pack the soil and so increase the evaporation. I do not say that corn would take the place of hay, but we cannot afford to give that amount of water to all of our crops.

DR. CONARD: I would like to ask the Professor how we can prevent a gully on our hillsides. I had a field very nicely prepared for clover seed in the fall, and I think I never saw anything finer or better than that was, but there came a very heavy thunder-storm, and it tore up that hillside so that now you can't drive across it with the mowing machine. In a few days, probably the same week, there came another rain a little worse than the first. That was two

years ago, and that hillside has been looking at me ever since. It is full of gutters, and you can't drive across it with a mowing machine. It is on the hillside. Now, what should be done with that? I don't know. And there is one other thing that happened that morning; in trying to gather up the soil a little at the foot of the hill there was the necessity of turning up the ground at the foot of the hill, up hill, so that the furrow turns up hill, and the gulches in that place did not dig nearly so deep as they did at the other places.

PROF. SHAW: I can only make a guess as to why it did not cut past that furrow. The nice upward tilt is the ideal furrow. It serves to hold the soil and prevent it from washing away. Down in Mississippi, where the soil washes much more than it does here, they fill the ditches with sassafras and scrub oaks, and all sorts of brush, with the brush end downwards, and they keep a constant watch to see that their soil is in good condition. I would suggest that you leave an occassional strip of sod that is not cultivated, changing it from year to year in order to keep weeds from forming there. The gully would be stopped when it reaches the sod.

DR. CONARD: What I have thought of doing is to put it in potatoes, and then fill in the ditches. How would that do, Professor? That hill is about a hundred yards along the farm, half way up, and then begins to strike the bottom half way.

PROF. SHAW: It might do, but you would simply cultivate the soil a little way down hill.

MR. HUTCHISON: I would say, looking along the railroad, and noticing the precautions that the railroad takes to prevent washing, that out in Cambria county, west of the Allegheny mountains, a new trolley road building there is digging ditches all along the road to carry off the water. Take the farm at Thorndale in that county. A few years ago my son was there, and he put a ditch all along that farm to prevent the water washing. Now, if we were to take some precaution of that kind it would save a good deal of washing. We cannot, perhaps, prevent it altogether, but if it pays the railroad companies to do this, would it not pay the farmer as well?

MR. KAHLER: I would like to speak of a little experience I had in setting up ditches; in filling them with brush, we always put the top end down. In order to prevent these steep hillsides from washing, we used to plant them with corn. We plant about ten rows, and then leave a little strip, which we have sometimes seeded with oats.

SECRETARY CRITCHFIELD: How wide do you leave those strips?

MR. KAHLER: About ten spaces. Now, in regard to turning your furrow up hill, you cannot get as smooth a furrow, as in turning down, but it will not run as quickly.

MR. LIGHTY: I am glad to notice in the audience some of our good, practical farmers from York, to listen to this discussion. Our

good Professor gave us some excellent points this afternoon, and I simply want to emphasize them. I had one of these farms that the Doctor speaks about, about seven-eighths gully; and the other eighth brushes. The Doctor's theory works all right there. There is nothing about a hillside that I have not learned here in York County. I had a scientific man to tell it, and a practical man to work it out. He said when they were well mother made them mush for breakfast, and when they were not well they got broth. The mush made by putting a whole lot of flour in a little bit of water, and the broth was made by putting a whole lot of water in a little bit of flour. Now, I don't know how the Doctor plowed that hillside, but I am pretty near sure that he did not plow 12 inches deep, or he would have had enough soil there to hold that water. And then, because the water runs down hill, I believe in plowing up hill.

PROF. SURFACE: Professor Shaw spoke about cultivating every two weeks; I should like to ask, if it should not rain, what about the cultivation?

PROF. SHAW: In case of rain, the cultivation should be just as soon after the rain as the ground is dry enough to get on it, whether it be two days or two weeks. Even in continued dry weather it is wise to cultivate. After a rain, especially after a light rain, it is always well to cultivate, because that little light rain, which may be only a half or a quarter inch deep may touch those films and get them to drawing more water out of the subsoil; if you do not cultivate, at the end of two days you may have much less water than you would have had if it had not rained at all, because evaporation is greater.

SECRETARY CRITCHFIELD: Never take the watering can to water your plants unless you water them thoroughly.

PROF. SHAW: Exactly; don't worry them.

PROF. SURFACE: Can it pay the average farmer to irrigate?

PROF. SHAW: I don't believe it will pay this section, unless in the case of garden crops. If you have a good strawberry patch, irrigate, but don't let it cost you more than fifteen or twenty dollars per acre more than you get in return from it. If you have a little stream flowing around your farm, I believe it would pay to irrigate.

MR. BOND: Do you believe in surface irrigation?

PROF. SHAW: It is the only kind of irrigation.

MR. BOND: Can I water my plants in dry season?

PROF. SHAW: If you follow it up, and keep wetting them thoroughly, and then cultivate.

MR. CLARK: Two weeks ago I was on a farm in Indiana. One section of the farm had been worked for quite a number of years, and it seems to have been farmed continually, so that the fertility is all taken out, and the land is beginning to wash. The land just adjacent to it is just as steep, but don't wash a particle, and I believe that the whole problem of washing lies in the fact that

the fertility—the humus has all been taken out of the soil, and there is nothing to hold the water there. Go back to our old orchards; in the orchards that were profitable, there was no washing, but after you got to a certain depth they began to wash, and I think if your soil is in condition to be profitable, there is no danger of its washing.

DR. FUNK: I want to agree with the Professor about harrowing. Now, I find that we get best results from almost constant cultivation. I get from two to four harrowings a week in our apple orchard. It has already had eight harrowings this year. I think the dryer it is, the more necessary it is to harrow.

MR. HERR: Do you use a spring-tooth harrow?

DR. FUNK: Both; spring tooth and smoothing harrow.

MISS BAKER: Is there any arrangements made to supply trees to persons who wish to plant them?

SECRETARY GRITCHFIELD: The Department of Agriculture has made none; the Department of Forestry has the matter under consideration.

MISS BAKER: As I understand it, the Pennsylvania Railroad has made arrangements to supply them at about $2 per thousand for transportation.

SECRETARY CRITCHFIELD: About that.

MR. HERR: We learn sometimes by our failures. I want to say that the worst washing I ever had—on hillside ground, I mean—was on a hillside planted in buckwheat. A heavy rain came along, and my buckwheat crop was minus. Now, harrowing is a good thing, but it did not prove so at that time.

SECRETARY CRITCHFIELD: I want to speak of a little experience that I had with the roller about twenty-five or thirty years ago, when I had sown grass seed in the spring crops, as I do sometimes. I noticed that where the horse would put down his foot, the grass would come up quickly, and I concluded that it would be a good thing when I seeded my barley to go over it with the roller. I did so, and got such excellent results that I have been doing it ever since.

MISS BAKER: I am told that the Pennsylvania Railroad has determined to plant locust trees, because of their quick growth.

MR. HUTCHISON: They have been planting red oak.

SECRETARY CRITCHFIELD: Because of their same ready growth.

MR. HUTCHISON: I cannot understand why they are planting red oak. A few years ago they refused to accept red oak ties because they were not durable enough.

A Member: They creosote them.

MR. HUTCHISON: They are doing that. A few years ago when we were selling them ties, they refused to take my word, but sent a man down to see that I was not giving them red oak.

MR. HERR: Why not grow chestnut?

MR. HUTCHISON: Because of the slow growth, and the straight line; when cut across the grain they split.

MR. SCHWARZ: I move we adjourn.

This motion was properly seconded, and duly carried.

SECRETARY MARTIN: One word before we adjourn. Friends, I am pleased to see you take such an interest in this discussion.

I want to call your attention to the program of this evening, which is a very interesting one: Dr. Funk will speak to us on "Commercial Orcharding," Prof. Penny on "Miscible Oils" and Mr. H. W. Collingwood, editor of the "Rural New Yorker," will tell us about "The Man and Woman Crop." I am sure you will all find it very interesting, and I hope to see you all here.

The members will please come up to the front after adjournment and get their badges. You will find them on the dask here, with some one to hand them to you. We will now stand adjourned until 7.30 this evening.

Tuesday, May 25th, 1909, 7.30 P. M.

Mr. E. J. Durnall in the Chair.

The CHAIRMAN: Fellow-members of the State Board, Ladies and Gentlemen: For the benefit of those who are in attendance on our sessions, and who may not be engaged in agriculture, it might be as well to state in this connection that, as representatives of the farming fraternity, we have a great deal to learn in the science of agriculture, indeed, if anything, it is still in its infancy. All-around-agriculturists are supposed to know a little bit of a great deal; I believe it is sometimes better to know a good deal of a little bit. We have with us an example of both this evening, and I take pleasure in presenting to you one who needs no introduction to you—Dr. Funk, who is well qualified to speak to us of the practical success of his subject, "Commercial Orcharding."

Dr. Funk's address was as follows:

COMMERCIAL ORCHARDING.

By DR. J. H. FUNK, Boyer town, Pa.

Mr. Chairman, Brethern of the Nobility, Princes of the Plow, Kings of the Orchard, Queens of the Home: I am proud indeed to stand before so many of my friends in this, our Annual Round-up Meeting.

I feel honored in being called upon to address the Original Aristocrats of the world, for the Crest of Eden is upon your escuctheon, and your vocation is one of the dignities conferred upon man before the fall. In it lies the foundation of all activities and civilization.

Agriculture is the mother of all industries, and they thrive only because she thrives, and you her subjects turn the wheels of the world, build the world's muscles, and furnish the world's tables.

And other industries prosper only as Agriculture prospers. So, gentlemen, you are above kings, for they must look to you for their bread.

Your responsibility is therefore great, your calling sacred. To be in close proximity with nature, in God's great laboratory, watching the mysterious forces, starting with the tiny seed, causing it to germinate, sending its minute rootlets down into mother earth seeking nourishment, and its crown seeking the light of day, the dews of heaven and the sweet kisses of the morning sun, welcoming its genial warmth to aid in its development.

If the saying be true, that the mental and moral statis, the nobility and purity of character depends upon what a man eats, then indeed the Nation's manhood depends upon what you grow, and as fruits took precedence in the Garden of Eden, and have a marked influence on the mental capacity of man, then truly the horticulturist merits the highest honors to be conferred.

It is only within recent years that Commercial Orcharding has attained any prominence among the business enterprises of the world.

In the earlier history of our country, when every variety of fruit grew spontaneous, and bore abundantly, with no marauding animals or insects or fungus diseases present to interfere with their thrift or productiveness, or to mar their beauty, when our virgin soils were full of all the elements necessary to their best devolpment, with humus in abundance, a veritable reservoir of moisture and fertility, in the most available form, and inexhaustible supply. Yet with all these advantages fruit raising was largely incidental to general farming. The farmer being satisfied if he had enough fruit for the use of his family, a few bushels to sell, enough to supply the vinegar barrel, and for drinking cider.

But a change has taken place, and instead of fruit being a luxury for the indulgence of the rich, it has become a necessity. and is called for and is placed upon the tables of the mechanic, clerk and every class and condition of people, no matter how humble, and is considered a cheap and healthy article of food.

What has been the affect of the change? While the demand has been increasing, the supply has been diminishing to such an alarming extent that unless a radical increase in production takes place in a short time the United States will be importers instead of exporters.

The United States statistics show that in the year 1895, sixty million, five hundred and forty thousand (60,540,000) barrels of apples were produced in the United States, and from then there has been a gradual but rapid decrease until in the year 1907 there were but 25,000,000 barrels produced, a decrease of over 50 per cent. Does it not behoove us as a nation to investigate the cause.

It is certainly not entirely owing to weather conditions, though the cutting away of the forests have changed climatic conditions to a marked degree. Lack of fertility from over-cropping and under-feeding, with poor cultural methods, have doubtless contributed their share to the cause of failure.

But the greater cause is beyond doubt the advent of the San José Scale, and in the last few years it has increased to such an

alarming extent that no matter where you travel the same conditions exist. The farmers' orchards are either dead or dying, and the average farmer is doing nothing to stay its progress, or replacing with new orchards.

This last winter, while at institute work in the central counties of the State, in eleven counties I did not see one dozen new orchards planted, and very few thrifty orchads of any age, and the majority of the farm orchards in the last stages of decay. This is indeed a sad condition, and it is only by the establishing of commercial orchards as a business that our fruit supply can be kept up to meet the demands of our intelligent and prosperous nation.

COMMERCIAL ORCHARDING AS A BUSINESS.

Growing apples and other fruits is like any other line of business. Some will succeed and live in fine houses, others will live to scratch a poor man's back all their lives.

But there is no vocation in which a man who has philosophy in his composition can get as much happiness, contentment and profit as in fruit raising.

He who plants a tree, plants Hope, Love and Good Will. He works not for himself alone, nor for the time in which he lives. but for the good of his fellow-men and the future.

It is an attractive business. Failure is impossible, if he posesses that defiant trinity, Skill, Enterprise and Progress. This combination is the sheet anchor that has made the building up of every great business a marked success.

The successful orchardists are specialists. Some in apples, some in pears and peaches, while others make a specialty of small fruits. They succeed because their work is concentrated, intensive. Everything is done for the tree or vine that can be done that it pays to do.

The main object of the special grower is to grow the largest quantity of the highest quality of fruit that can be produced on an acre.

To accomplish this requires an immense expenditure of study along every line.

What are the requirements of a successful fruit raiser? He must be a good farmer, and understand working the soil to get it in the finest tilth, that it may retain moisture, so necessary to success.

He should be enough of a chemist to understand the mixing of fertilizers, to know what chemical changes takes place, that the proper food elements are set free at the time they will do the most good to the growing crops.

He must be an entomologist, to identify the insect enemies that injure his crops. Their life history should be understood, that he may know how and when to combat them.

He should familiarize himself with the various fungus diseases, and how to keep his trees and fruit immune and in a healthy growing condition.

He must read, think, study and apply the knowledge obtained, in a manner that will be most affective.

He must be a good business man, to buy his supplies and market his crops to the best advantage.

Fruit growing is high-class farming on intensive principles, and is undertaken largely by bright, observing men who are more interested in their profession than the ordinary farmer. They are men who are above the ordinary in intelligence and energy.

As time passes we note more the need of man taking the initiative, and leaving less to nature.

In old times, and in opening new territory, extensive methods were doubtless more profitable.

In extensive farming Nature is depended upon to do the greater part, man comparatively little.

In intensive methods the opposite is attempted, and Nature is assisted and encouraged to do her best.

As time passes and land becomes scarcer, labor higher, better methods must be adopted.

There are many things to be considered in fruit raising. The field is so broad, and embodies so many features, any one of which would give material for a long article, we can at present include only the most important.

Whatever views I may express shall be limited to those obtained from personal observation, and I shall ask you to make all necessary allowance for variation in soil, climatic conditions, &c., which may vary somewhat from your local conditions.

The most important factors are: Soil, latitude, altitude, location, exposure, culture, varieties, adaptibility, transplanting, pruning, thinning, picking, packing and marketing, insect and fungus diseases, spraying and spray material, making and applying.

SOIL

Is an important factor, as a congenial soil favors the best development of tree and fruit.

If too sandy it is not sufficiently retentive of moisture or fertility, as it lacks humus, and in dry seasons, when the fruit is maturing and needs abundance of both, they fail, the fruit ceases to grow and drops.

Clay is too compact, being almost impenetrable to water and air, making a heavy cold soil that is uncongenial to the best development of fruit of good color and quality.

For the apple, other things being equal, a good deep clay loam is the best. I say this for if the surface soil is thin, the rock coming near the surface, it will not be profitable.

It should be fertile, containing an abundance of mineral and organic matter, without which no crop can grow.

ALTITUDE.

This is of more importance than most people think, and it should be given due consideration. An orchard must be well exposed to air and sunshine, as they are the great germ destroyers. An orchard fully exposed is much less subject to fungus diseases.

Avoid narrow valleys and deep depressions, or small streams, as they are subject to late frosts in the spring, and early ones in the fall. The former is very disastrous to fruit buds which have become expanded by a few warm days in these apparent favored nooks, the cooling influence of radiation has lowered the temperature,

the air becomes chilled, becomes heavier and flows down into the depressed situations. This when near the freezing point becomes dangerous to fruit buds and bloom. The ideal site is somewhat elevated above the adjoining land, thus giving both water and air drainage. The latter is the most important, as soil drainage can be given artificially.

Flat low lands are more subject to frost than high lands.

A very slight elevation is often sufficient if bordering on an open valley to give opportunity for the cold air to pass away freely.

The Paragon Fruit Farm lies on a hillside with a rise of over 100 feet. The lower rows are nearly level with the creek passing within 200 feet. But to avoid late frosts, I planted late blooming varieties along the bottom. The Rome Beauty invariably open their's late enough to escape.

Elevation alone is not sufficient, it depends upon having a free outlet for the cold air.

EXPOSURE.

This is an interesting topic of inquiry. Some planters choose a southern or southeastern exposure, thinking the fullest exposure to the morning sun essential.

Others choose a northern, thinking this retards vegetation, holding the buds from expanding so early, thus avoiding late frosts, and moderating the heat in summer.

The Paragon Fruit Farm lies on a knoll, sloping in every direction, thus affording an excellent opportunity of judging which is best, but thus far I have been unable to detect any difference.

Many think the northern exposure remains frozen later and thus holds back the bloom.

But the fact is, that the tree can and does, when the season arrives and the weather is favorable, expand its buds, and send out leaves and bloom if the sun shines upon the top during the greater part of the day, even though its roots are imbedded in ice and snow. For in the spring the top acts independent of the roots, in response to the call of nature when the tops are acted upon by the warm rays of the sun, excitation takes place in the buds, they draw upon the reserve forces stored up in their cells from the previous season, growth continues until the frost is thawed out and the roots are enabled to send up a fresh supply of raw material to supply the demands of the tree.

Strawberries may be held in check by being covered and the ground kept frozen, because here the entire plant, top as well as root, is in cold storage.

LOCATION.

This is of great importance in a commercial orchard. In a family orchard, convenience takes precedence. But when it comes to investing large sums of money and time in building up of a permanent business, it behooves us to look to the future.

Several things are essential to success. The principal ones are: First, shipping facilities; the nearer the orchard is to the railroad station, other things being equal, the better the prospects, for if it is located several miles from the station, and the fruit must be conveyed by wagons over a rough country road, the loss of

time, expense, and injury to the fruit go far toward making it an unprofitable industry.

Help must also be looked after, for should the grower be unable to get sufficient help at the time the fruit is mature, to gather and store it great loss may be the result through storms, freezing, &c.

It is more economical to purchase suitable land close to these facilities at a high price than to take an unsuitable piece of land at a gift. The former with proper attention will be very profitable, while the latter will almost inevitably be a failure.

PREPARATION OF SOIL.

The soil should be broken up deeply (preferably in the fall), 12 or 15 inches, if possible, leaving it without harrowing, to be more thoroughly acted upon by freezing. Then in the spring put it in the finest condition possible. Now is the time you have the opportunity, before the trees are planted. Should there be any low places where drainage is not perfect, this must be looked after, as no tree or plant can thrive with a wet, soggy soil. This can often be improved by plowing in the way favoring drainage. If not, then tiling should be laid. It will prove a good investment, as it will not only rid the soil of surplus water, but also admit air more freely.

FERTILIZING.

If the land is not fairly fertile, manure of some kind must be applied.

If humus is lacking, then stable manure, fifteen or twenty tons per acre, should be spread evenly over the ground before plowing. Should the soil lack the mineral elements, phosphoric acid or potash, these can be applied in the cheapest form, acidulated rock, and muriate, or sulphate of potash. These are the dependible fertilizers for fruit development.

VARIETIES.

The careful selection of varieties is an important factor in profitable orcharding. They must be adapted to the locality. The trees must be vigorous and productive, bearing good crops annually.

The fruit must be attractive in appearance, of good form, and bright red in color. It must be of high quality.

The ideal apple must possess the following characteristics: Tree a good grower, stem straight, open head, foliage not subject to fungus diseases, an early bearer, an annual bearer of large crops of fruit of good size, highly polished red apples, adhering well to the tree until fully matured, a good keeper, flesh yellow, crisp, juicy, core small, flavor of the best.

An orchard made up of trees possessing these qualities will be a veritable bonanza to its owner. Are there many such orchards? No, it is with orcharding, as it is with dairying, the profits are made by the few.

Personal liking or prejudices too often govern the planter.

Nurserymen's catalogs, filled with introducers' descriptions, is another pitfall for the unwary.

Too many varieties is another serious fault.

The horticulturist who loves his business is a progressive fellow and plants too many trees as an experiment.

What shall we plant? For a family orchard plant Yellow Transparent, Red Astrachan, Williams Red, Jefferies, Summer Rambo, Wealthy, Grimes Golden, Nottingham, Hubbardston, Heiges, Smokehouse, Stayman Winesap, Salome, Rome Beauty, Highfill, Paragon, York Imperial and Nero.

These varieties are sufficient for the family orchard. The commercial orchard should have but few varieties, and might be made up of Yellow Transparent and Williams Red for early, where there is a good demand for early apples. Summer Rambo, for a second early, is productive and a good all around apple. To this may be added Grimes Golden, and Nottingham for late fall, but the largest planting should be winter apples, and I believe that an orchard planted one-third Hubbardston, and two-thirds Stayman Winesap, will make the grower more money than any other varieties that can be planted, as they are both extremely productive of large, fine-appearing apples of high quality, always bringing the highest prices in the market.

TRANSPLANTING.

For the apple it makes but little difference whether planted in the fall or spring. If there is a choice it would be in the fall. First, you can get better stock before it is depleted by heavy sales.

Second, the planter generally has more time in the fall, and gives more care to the planting.

Third, the fall-set tree has time for the roots to callus and sends out new roots before the buds start in the spring, and is thus better prepared for the drain upon it through evaporation from the foliage. Fall planted trees generally make a better growth the first season. If planted in the spring, it should be as early as the ground is in condition.

LAYING OUT THE PLOT.

Leave sufficient space around the tract for convenient turning while cultivating, at least thirty feet. It is not lost ground. Then, with an assistant and a tape line, beginning at a corner, measure and stick stakes every thirty-five feet all round the plot. When running the intermediate lines place sight poles at the stakes, and the lines are easily made straight.

If the land is in good tillable condition this can be done better with a good team and a large plow, running back and forth three or four times, which opens a large, broad and deep furrow and puts the ground in better condition than can be done by digging holes, and at one-fourth the cost.

In planting, the tree should be set about one inch deeper than it stood in the nursery, and the soil should be firmly packed around the roots. Many trees are injured and growth stunted by too deep planting and often never recovers.

AGE OF TREE.

If a peach, never beyond one year old from the bud. If an apple tree, a one year whip without limbs 4 to 6 feet is preferable for several reasons. First, a tree of this kind is a tree of strong in-

dividuality, with a good root system. It is full of vitality, the very cream of the nursery.

Second, it can be dug with less injury to the roots, less shock is given to the tree, it is less liable to suffer by transplanting, and starts off more readily, and makes a much stronger growth than an older tree that has a larger top to support and less roots to do it with. A tree of this kind will come into profitable bearing sooner than the older tree.

As every planter has his ideals as to shape and form, a young tree without limbs can be trained as desired. If the planter wants a high tree, he can train it thus, or he can train to a low head. He can start with 3, 4 or 5 limbs, or as many as he desires upon which to build the head. He can give it any shape or form.

SHAPE OF TREE.

Low heads are to be preferred. They are not so liable to be injured by heavy storms, as the leverage is less. The trunk is better shaded, and the ground kept from drying out so much in summer. The tree is more convenient to manage, it can be pruned and sprayed from the ground, the greater part of the thinning of the green fruit, and the gathering of the matured fruit can be done from the ground, and the balance from a low step-ladder, greatly lessening the expense of the orchard management. A man can pick many more bushels of fruit and handle them with more care while standing on the ground than if he is twenty or thirty feet in the air.

Some orchardists claim the fruit grown on the upper limbs are the best. The same arguments hold true on low-headed trees, as they have as large a surface exposed to the sunlight as high trees, and if the tree is properly pruned with an open head, every specimen of fruit will sometimes through the day get sunshine and free circulation of air. These are essential for fine fruit.

PRUNING.

Time will not permit going into details on pruning, as only the most important factors will be treated here.

All mutilated roots should be cut away. All other roots should be cut back, from below outward to about eight inches in length. The top should (if a one-year-old tree) be cut back to about 24 inches from the ground, cutting off above a sound bud. When the dormant buds have made a growth of one-third to one-half inch, rub off all but about five buds. These are to form the framework for the top. Never leave two buds opposite, as they are apt to form a fork which is liable to split when laden with fruit, or from storms and ice incrustations. These buds will grow rapidly, and must be watched, the upper bud becomes the leader, and will grow the fastest, and may need pinching back to check growth and throw more growth into the laterals, thus equalizing the top.

If the tree is two or three years old, with the top already formed, and often very ill-shaped indeed, the limbs should be cut back fully three-fourths of last season's growth, cutting above an out side bud. If it has too many limbs, cut some away, using judgment to get a symmetrical top. The second season the last year's growth should be heavily pruned, cutting to an outside bud to

spread the tree. This should not be omitted, as the greater the expanse according to height, the better for fruiting. Prune away all useless limbs. If this is attended to while the tree is young, large limbs will not have to be cut away later, which should be avoided if possible.

WHEN TO PRUNE.

Whenever the tree needs it, never prune without a purpose. If a limb is in the road take it away at once before it drains heavily on the tree, and give the laterals on the other limbs a chance to spread and develop fruit spurs.

A young orchard needs healthy, vigorous wood growth. For this purpose spring pruning is preferable.

If the tree has attained bearing age, but lingers in doubt, adopt other methods. Prune in June to develop fruit buds.

Leaf buds and flower buds are not structurally distinct, every bud on a tree is formed as a leaf bud, and every bud on a tree has the power under proper conditions of becoming a flower bud.

Leaf and flower buds are interchangeable

By pruning away a branch immediately above a flower bud, it may change to a leaf bud.

By ringing a limb below a leaf bud, it may be converted into a flower bud.

Factors that tend to the formation of flower buds are any restriction of the prepared food in the branches, such as ringing, bending the limbs. Dry weather is also conducive of flower buds.

Since during dry periods, evaporation through the leaves is rapid, the sap becomes concentrated and rich in prepared food.

When water supply is abundant, the tendency is toward wood growth and leaf buds. Rapid growing trees seldom bear much fruit.

Anything that retards growth increases the fruit yield. Fruit buds do not generally develop until after wood growth ceases, then continues until fall.

THINNING.

By thinning we mean the removal of a portion of the young fruit, and thus prevent overbearing.

Many factors may arise to prevent annual bearing. A light crop generally follows an excessive one. There are no reserve buds. Only the buds formed the previous year are developed, and the draft upon the tree necessary to develop so much fruit prevents the formation of flower buds for the next season.

Climatic conditions control more or less bud formation, yet the intelligent horticulturist may so change conditions as to make Nature's laws subservient to his will.

Thinning is one of the great aids. By removing a large portion of the young fruit, the excessive drain upon the vitality of the tree is prevented. The fruit attains much greater size and improves the quality, and allows the tree to grow good, strong buds for the crop the following season. It is not the edible portion, but the seed that exhausts the tree, so by thinning in connection with other cultural methods an annual crop of fruit of one quality may be expected and the grower will realize much better prices.

CULTURE

This is a mooted question with fruit growers, whether to adopt clean culture, mulch or sod. All have their advocates, and all their successes. All these methods, if other details are properly attended to, will succeed.

It is a matter that must be controlled by the environments, such as location. Steep hillsides could not be kept under clean cultivation, as there would be too much loss by washing.

But where land can be cultivated, I believe a young orchard will make better growth by clean culture. In later years, when in bearing, it makes less difference if the tree is well fed.

Mulch is Nature's method of enriching the soil, and this may be used to good effect in fruit raising as well as growing forest trees. I hope I will not be misunderstood. I do not mean to say that fruit raising and forestry requires the same treatment.

Nature aims at reproduction, seed development, at the expense of the edible portion.

Man works for the edible part at the expense of the seed. The nearer he can eliminate the seed from the fruit the better it suits his purpose, consequently he must work along different lines.

Clean culture will produce larger fruit, but it will lack color and quality. Sod will produce crops of fruit somewhat less in size, but of higher color, better quality, and will keep longer. But space will not permit the continuance of this topic. Suffice to say, adopt the method that best serves the conditions, but never omit feeding the tree.

PICKING.

Never pick fruit until it has fully matured. If picked too early it lacks color and flavor. On the other hand, never let it get over-ripe. Fruit picked in this condition will not keep well.

Use care in picking, do not break the stems more than necessary, do not handle roughly. All fruit should be picked carefully in baskets. Never in bags, as too many do. They become bruised by every motion of the picker. Such fruit is not only unsightly, but its keeping qualities are impaired. When picked it should not be put in piles in the orchard, as the exposure to heat and cold, air and moisture hastens the ripening process leading toward decay. But it should be hauled on spring wagons to a cool packing house, to be graded and packed in clean new barrels or boxes and shipped, or stored in an even temperature. If to be kept long it should be placed in cold storage, where the temperature can be maintained at between 30 and 32 degrees F.

PACKING.

If the fruit is fancy, of uniform size, well colored, and good quality, such as is wanted for fancy dessert fruit, then the standard bushel box is the best package. Each fruit should be wrapped in neat, suitable paper and packed, that each box, according to the size of the fruit, will have an equal number of apples, the same as oranges.

All others should be packed in barrels, but those also should be graded.

Avoid packing all small, wormy, knotty, ill-shaped fruit.

Assort into four grades, fancy, No. 1, No. 2 and culls. In facing, put first in the bottom of the barrel a corrugated pasteboard header. On this place the so-called headers (which should be of medium size, uniform and nicely colored). Place the stem end down, fitting them tightly until the bottom is covered, then place a second layer on top of these. Then pour gently on top of these a basket of fillers and give the barrel a gentle shake. Continue until the barrel is full. Even off the top, having it filled about one inch above the barrel. Place another corrugated paper on the fruit, place the head on this and with a screw, or a foot press bring it gently into place, tighten the hoops, put in cleats to hold the head firmly in place. Turn the barrel, cleat this end, and label according to the quality the package contains.

Never attempt to deceive. It is a poor business policy. Never face with choice fruit and put inferior fruit in the middle of the package and label fancy. Always label true to contents. The only one deceived, or fooled eventually will be the owner, as his sins will surely find him out. Sell all packages under a full guarantee. Have a trade mark and make the standard so high that it alone will sell the fruit.

MARKETING.

If you have followed the other requirements, all you have to do will be to hold until the prices suit you. You need not seek for customers. The customers will seek you. One satisfied customer makes many. You can control the market regardless of gluts of inferior goods. I never saw a glut in fancy goods.

INSECTS AND FUNGOUS DISEASES.

They are here, and here to stay, and unless the fruit raiser is wide-awake to his best interests they will run him out of the business. If you doubt this look at your own orchards, and the fruit you raise. Then look at your neighbors. Many of you have traveled nearly across the State to get here, and have doubtless taken notice of the condition of the orchards. If not, then on your homeward trip keep tab on the good thrifty orchards you see, also note those off color, the dead and dying. Note how many young orchards you see planted and the condition they are in. When you get home look over your notes. Then answer for yourself as to the future of the apple industry of Pennsylvania, and most other states are in the same condition. Can this state of affairs be remedied? Yes, but you must do it yourself. Do not depend upon your neighbor. Do not depend upon the State, the Government, or any other source of help. Get right at it. Keep at it, open a warfare that will be irresistible. Vanquish the foe. If it is the San Jose Scale spray him. Make it so everlasting uncomfortable that it will yield up the ghost.

If the Codling Moth makes your fruit unsalable, resort to the same measure.

As soon as the bloom drops, give them a dose. Apply it with energy and power. If one dose is not enough, give them two, and they will call it quits.

If other insects trouble you, treat them accordingly. If they are masticating insects, give them a dose of the arsenites.

If they are sucking insects, give them a contact remedy. Cover their hides, throw it in their eyes, and they will let go their hold.

If it be the Scab, Bitter Rot, or any other fungus disease, act on the defensive, or rather the preventive, as you cannot cure. You can prevent, and hold it in check, and thus save what is not affected.

Use the copper salts, or the dilute sulphur sprays.

As to the manufacture of these various sprays, they have been so fully treated in the many bulletins issued by the various colleges, and by eminent writers for the various agricultural and horticultural papers, that it would be a waste of time to enter into details. I will merely say here that I believe that the lime and sulphur spray will be as much and as successfully used as a summer spray as it is now used as a winter spray.

WILL IT PAY.

This is, of course, the natural inquiry, and to the careless, indifferent farmer it will not pay. The greater bulk of farmers are willing to let go before they get a firm hold. Dont get discouraged; get a firm grip and hold on.

The man who has a good orchard ten years from now has a bonanza, a better paying dividend investment than Standard Oil stock, and one that is untainted.

There is no business opportunity today that offers our young men and young women (and even you older people) such good inducements as fruit raising. It is pleasant. It is healthful. It pays big, and it will pay better in the very near future.

I could point out many large commercial orchards scattered all over this country that are bringing in their owners princely incomes. But I will not weary you with statistics.

The old saying is, all things come to those who wait. But my advice is: Don't wait, but go after it. Keep after it until you catch up. Then get ahead and keep in the front rank, and all the good things intended for the use of man will be yours.

MR. HERR: It just occurs to me to ask whether these two varieties you name are not self-pollenizing to a sufficient extent

DR. FUNK: I believe that an orchard planted two-thirds Stayman Winesap and one-third Hubbertson will have the advantage of cross-pollenization. They seem to harmonize, and wherever they are planted side by side, you will find the best results. In New York State a few years ago there was planted seventy-five acres of Baldwins, no other apple in the orchard; the first few outside

rows bore well, but towards the centre there was scarcely any fruit. I believe you will find that cross-pollenization is an advantage.

PROF. SURFACE: How high do you cut them off?

DR. FUNK: Two feet in apple; in peach, 10 inches to 12 inches; in the peach I like to have four or five limbs; in the apple, nine limbs.

MISS BAKER: Would you think of cutting down a tree if you knew it had root galls?

DR. FUNK: Yes; I would cut it down and put it in the brush pile and burn it; I never think of treating a sick tree. It is like a veterinarian doctoring a sick chicken.

MISS BAKER: The reason I asked was, I think the report of the Adams County Association says it is not serious.

DR. FUNK: It kills the circulation, and that kills the tree.

MISS BAKER: If you found that by grafting on a certain kind of fruit you could avoid it, would that be advisable? Are there some varieties more addicted to it than others?

MR. FUNK: If you have scions that are good and healthy you will certainly not get it. Any tree of naturally weak growth will take any of the fungous diseases much quicker than will a tree that is of strong and healthy growth. Now, in peach trees, I found that by getting them from a certain nursery, I always had trouble with them.

A Member: In grafting a tree, whereabouts does that take place?

DR. FUNK: I don't think I will answer that question; I make it a rule never to do guess work.

A Member: Would you recommend the Baldwin as a standard apple?

DR. FUNK: That depends very much on the altitude. With you I think it is 500 feet. You are lower here than I am; I am 40 degrees, and my altitude is 600 feet, and the Baldwin is a fall apple with me. If you are north of latitude 42 degrees, you are in the home of the Baldwin.

A Member: Which is the larger, the Hubbertson or the Stayman Winesap?

DR. FUNK: The Winesap, although the Hubbertson is a good-sized apple with me. Maryland produces a larger Winesap than we do. With me they are about two-thirds larger than a good-sized Baldwin, and we have them more highly colored than Maryland.

MR. HERR: In planting an orchard of Baldwins, would it be best to go to Southern Pennsylvania or New York State?

DR. FUNK: I don't care where it is raised; what I want is the tree and the fruit. In Southern Pennsylvania it is a fall apple; moving it north makes it later.

MR. HERR: I imagined the trees in Southern Pennsylvania would not ripen so early.

DR. FUNK: They become to a certain extent acclimated.

DR. CONARD: How does the Baldwin in this county compare with the other two varieties you name?

DR. FUNK: Well, the quality is very little better than the Ben Davis.

MISS BAKER: When one is about to plant an orchard of a thousand or fifteen hundred trees, and has no knowledge of orcharding whatever, to whom should one apply for instruction?

DR. FUNK: I don't know that there is any one who instructs in regard to trees. We have the nurserymen, but they are usually too busy.

PROF. SURFACE: We have our inspectors who inspect the nurseries, and give certificates regarding the trees.

MISS BAKER: That is for inspection only?

PROF. SURFACE: Well, they would not accept a tree that is not perfectly healthy.

DR. FUNK: I would pay 35 per cent. more for a tree that is not fumigated than for one that is.

PROF. SURFACE: That is the one point where you and I do not agree, Doctor; but it is a good-natured difference.

MR. HUTCHISON: Apply to the Department of Agriculture or to Secretary Critchfield; they will see that they are inspected if there is no certificate.

PROF. SURFACE: It is costly in the end to buy a lot of cheap trees that bear no certificate of inspection. If our men are within a county or two of you at any time, they will be glad to go to see you.

A Member: I would say that a tree bearing a certificate carries no assurance that it is going to bear well.

MR. STEPHENS: I believe Prof. Surface has not stated the case fully. He has scattered all over the State some twenty-five inspectors, and I think if you request him to send one of them to come and inspect your trees, he will do it.

The CHAIRMAN: The discussion is interesting, but we will have to pass on to the next number, which is a talk on "Miscible Oils," by Prof. Chas. L. Penny, of State College.

Prof. Penny's address was as follows:

MISCIBLE OILS.

By PROF. CHARLES L. PENNY, State College, Pa.

Petroleum oils have been used as insecticides now for a number of years. Apparently their use is growing, rather than lessening, and this in spite of much distrust of them, high cost, or unusual difficulties of preparation.

Why these oils are poisons is hard to explain, though as much might be said about many other poisons. Possibly if this phase of insecticides were better understood, better agencies and methods would be possible. But at the very start, any one seeking new means of attack on an enemy so numerous, prolific, and widely scattered as are many insect pests, is embarrassed by the question of cost. To suppose that five per cent. of the material applied to leafless trees ever hits them at all, to say nothing to remaining long enough to kill insects, would seem to be an extravagant estimate, far above, rather than below the truth. Such a use of materials must be expected as probably wasting 90 per cent. or 95 per cent. Hence it is evident that of the large number of insecticides very few would be cheap enough, however excellent they might be in themselves, to be used profitably in so extensive an operation as orchard spraying.

Most true, poisons seem to be poisonous to all grades of life, though, fortunately, in different degrees of intensity, or with different degrees of susceptibility. The exception is found in poisons that act on the higher nervous system.

This fact demands a rather delicate, sometimes an impossible, gradation of the strength of the poison to the peculiar circumstances of the case. As the insects to be destroyed are closely associated with vegetation, it becomes an essential feature of the problem to kill one, and not seriously harm the other. The innocuous character of spray material is even more important, if possible, than the poisonous character; it is even more important to spare than to kill. The sensitiveness of both plant and insect is different at different stages of their lives, or at different seasons of the year; hence we find seasons at which the problem is easier than at others, and some seasons at which it may be well-nigh impossible.

But generally the lines are inconveniently close between the sensitiveness of the plant and that of the insect. Were it otherwise, the problem would be much cheaper and easier. In fact, we must suppose that it costs more money to save the plant than it does to kill the insects; that is, the protection of the plant entails more

than double the care and expense necessary to kill the insect alone.

Petroleum oils used as insecticides are amply strong—strong enough to stand dilution from ten to twenty or twenty-five fold. Furthermore, vegetation would suffer severely, usually fatally, from most undiluted oils. The only exception is found in winter, and then not certainly. This fact, from an economical point of view, is fortunate, since the same money spent for oils may be made to bring greater returns through proper dilution. In actual practice, the dilution of oil brings peculiar difficulties, and these difficulties are the sole cause for the existence of "Miscible Oils."

Liquid sprays may be considered in two classes: First, true solutions, such as ammoniacal copper, lime-sulphur washes (in their essential portion), bluestone, &c. Second, suspension of the active agent in water, such as Bordeaux, various arsenicals, &c.

The former class admit of instant and convenient dilution—a permanent dilution; the latter class may be diluted about as readily, though the suspension is never permanent, no matter what the strength may be, but demands rather constant agitation.

In this respect petroleum oils are in a class by themselves. They are not soluble in water, and they permit very brief and imperfect suspension when simply mixed with water as other materials are. Proverbially, oil and water will not mix. The whole end in view in compounding miscible oils is to make petroleum oils like other spray materials in this respect, viz., to make them mix with water in any proportion.

The mixing of oil and water has been attempted in two different ways: First, mechanically, and second, by the use of certain chemicals.

The mechanical method has generally consisted in pumping the two fluids through a common nozzle under a high pressure so that the two fine sprays should commingle for at least the brief instant required to pass from the nozzle to the tree. The proportion was regulated by the variable capacity of two pump barrels with adjustable stroke—or in some cases, by the size of the nozzle. An ingenious nozzle was devised for the purpose nearly ten years ago by Prof. E. D. Sanderson, now director of the New Hampshire Experiment Station, on the principle of causing oblique and fine streams of oil to infringe against a central stream of water, the mixture occurring at the point when the two liquids escape, a common air-pressure acting on both oil and water. The device is certainly ingenious, at least.

From the fact that mechanical mixers of some sort have been long known, pretty widely used, much advertised, are by far the cheapest method, and notwithstanding, seem to be used now but little, it might be inferred that such devices have not been found wholly satisfactory in practice. Imperfect mixture, too coarse a mixture, giving large, undiluted drops of oil, inconstancy and uncertainty of proportion, seem to be defects never satisfactorily obviated. Were it otherwise, it would be hard to see any reason at all for the various miscible oils now used, either costly to buy, or troublesome to make. Personally, I question whether a good enough mixture can ever be made by any mechanical force whatever—a mixture fine enough to be a real dilution, and constant enough in proportion to be reliable.

The second mixture of oil and water makes use of certain chemicals to bring about a fine state of division and a most intimate mixture. Such mixture, if fine enough and intimate enough, are called emulsions.

Emulsions seem to consist of final divided globules of fats and oils suspended in water. Why the globules do not run together at once is hard to explain, but that they do not, at least for a time, is evident from the most familiar emulsion, milk. It is doubtful if mere mechanical force can be brought to sub-divide an oil into globules such that they will not run together. Some re-agent seems always to be necessary. All the emulsions of petroleum oils described seem to depend upon some kind of soap for their formation.

It has been known for a long time that kerosene emulsions can be made by the use of soap. The difference between the older method and those used in making miscible oils lies chiefly in the amount of water present when the kerosene and soap are first brought together. Common soap dissolves in water; it also dissolves wholly, or in part, in kerosene, provided there be not too much water present. Now, so far as we can understand the cause of emulsions such as are here discussed, it seems to be that the soap first dissolved in kerosene and then thown in the water, dissolves in the water and in doing so divides the kerosene into exceedingly minute globules, which for some reason remain apart for a time, whether minutes, hours or months. Any thorough explanation of emulsions we are unable to give, for there are many mysteries and seeming contradictions to be found, but the general principle seems to be that a soap separately soluble in both water and kerosene, will, if first dissolved in kerosene, usually cause an emulsion when the kerosene is mixed with water. That such is not always the case is simply an instance of the vagaries to be found in this subject.

While soap is the indispensable constituent on which the formation of these emulsions depends and which will of itself cause excellent ones, there are other substances that greatly assist in the process. Such are carbolic acid, ammonia, and strangely enough, water. These alone will not cause emulsions, but in conjunction with soap, they sometimes improve them.

That we are unable as yet to prescribe precise laws governing the making of emulsions need hardly cause surprise if we consider how thoroughly the great natural emulsion, milk, has been studied, and how little it is understood.

Viewed under the microscope with a power of about 200 diameters, various emulsions show marked differences. In most cases there appear globules sometimes fairly uniform, sometimes varying greatly, in size. These range from a few hundredths of an inch down to less than one ten-thousandth of an inch, or to the point where they become invisible.

The soap-kerosene emulsion made in the old way by boiling with soap and water shows the field completely filled with densely-crowd ed, rather uniform globules, whereas the emulsions from miscible oils, containing as much kerosene, show but a paltry fraction of the number of globules. If we assume that all of the kerosene in the former case is in the form of visible globules, then in the latter

case, certainly not one-tenth, more probably not one hundredth, of the kerosene is visible under the power used. In other words, in the latter case it would seem as if only a very few straggling globules of oil are large enough to be visible at all. In all probability, nine-tenths, or even ninety-nine hundredths, of the kerosene is so finely divded as to be wholly invisible when magnified two hundred diameters.

As just intimated, the old-time domestic kerosene emulsion was made by mixing soap suds and kerosene, sometimes with the aid of heat, sometimes with rigorous mechanical agitation. The emulsion was not very permanent, nor was it concentrated; it was necessary to subject to the treatment nearly all of the liquid to be used finally.

The miscible oils, at least those of published formulas, depend on soap likewise for their emulsifying properties. But in this case the soap contains little water, possibly none, and is commonly dissolved in the petroleum oil. The soap may be made specially for this purpose, or commercial soap may be used; in either case, carbolic acid greatly facilitates the solution. Once mixed, the proportion is good indefinitely, at least over a year, and at most, requires no more than vigorous stirring to make it perfectly usable. The soap mixture, which may be called the "emulsifier," is the only portion that requires heat, or manipulation of any sort. Now, the emulsifier is but a small part of the final spray material; in fact, from 1-150 to 1-200, according to dilution.

It will be clear, then, that a few gallons of the emulsifier will suffice to treat a large quantity of petroleum oil, the proportion varying with oils used, from 1-12 to 1-15; sometimes the ratio is wider.

The method of making the emulsifier and of mixing it is rather too technical for a detailed description here; it may be found set forth fully in a number of experimental station bulletins. We can consider here still further only some general properties of miscible oils, directions for using the oils, and their value.

Crude petroleum is a mixture of very various bodies, some exceedingly volatile, more so than gasoline, others non-volatile at normal temperature, with many grades between. In practice, three kinds are used for spraying: crude oil; the common refined coal oil, or "kerosene," and a heavy lubricating oil, commonly called "paraffine oil." The choice of these is extremely important.

Now, orchard tests with the light kerosene emulsions and with the heavier oil emulsions all seem to lead unmistakably to the conclusion that kerosene emulsions alone are not efficient insecticides for winter use unless in extraordinary concentration; that something more viscid than kerosene, with more body, and perhaps with better staying qualities, is needed to do the work. There seems to be good evidence that kerosene is efficient when used in sufficient concentration, but it probably evaporates too rapidly to permit to its fullest efficiency. Furthermore, it seems probable that the virtue of the heavier oils is due not only to their greater permanence, but also to their viscosity or gummy character.

The conclusion that kerosene in moderate amount is inadequate as a winter spray and that the heavier oils must be used during that dormant season, should not be understood as contradictory of

some of the excellent results reported by some investigators with kerosene emnlsions. These, however, usually contain a relatively high percentage of kerosene, in some cases as much as 25 per cent. or 30 per cent., whereas 10 per cent. of miscible oil is a very strong emnlsion, and as the miscible oil is in part water, soap and carbolic acid, the oil portion is less than 7 per cent. and often only 5 per cent. of the winter spray material.

It seems most probable that the period of working of these oils must extend over many days; hence it is clear that a rapid loss from evaporation is a loss of efficiency, and thns becomes a most important consideration. Where action is practically instantaneons, as with a cyanide, volatility has no significance, but with oils it is wholly otherwise. This difference probably explains in a measure why so much more kerosene than crude oil is needed to accomplish the same resnlt.

Kerosene is the easiest oil to emulsify, soap and carbolic acid being all that is required. The heavy oils are more difficnlt, and for some reason respond to treatment mnch better when a small amount of an additional oil is used, viz., rosin oil.

A perfect miscible oil ought to fulfill two conditions: First, it onght to remain nnder all conditions of temperature and rest, perfectly uniform throughout, without any separation into layers of different density and composition, and second, it ought to give an emulsion infallibly when mixed with water in any manner whatever, whether the water be added all at once, or in small qnantities at a time. These two conditions are sometimes fnlfilled at once, bnt not very often in the case of some of the formnlas. It is relatively easy to secure either one, but frequently quite difficult economically to combine both in a single oil. That is, it is nsually easy to prepare a miscible oil that will remain in a homogenous uniform solution, but it will not give an emulsion nnless the water be added in a pecnliar way, that is, gradually. And, on the other hand, it may be easy to make a miscible oil that will give an instant emulsion, directly mixed with a large volume of water, bnt the miscible oil itself, before it is mixed with water, will frequently separate on standing into two or more layers of different density and composition.

As many, or most, emulsions depend on a soap for their existence, anything that decomposes the soap will cause free oil to separate. Most salts of metals, other than those of the alkalis, soda and potash, free acids, lime, etc., will do this. Hence most insecticidal and fungicidal preparations are incompatible with these emulsions; Bordeaux mixture, lime and snlphur, copper sulphate, or "blne stone" solution, and lead arsenate all decompose the soap and cause free oil to separate. Copper acetate canses a separation of oil, but more slowly; it might possibly be used if sprayed quickly. An exception is Paris Green; this simply mixed with an emulsion has no effect. If, however, it is dissolved in ammonia, or ammonia be in the emnlsion, there will be a rather speedy separation of free oil. Ammoniacal copper carbonate decomposes the soap, bnt if there be much ammonia it does so only slowly; it might be possible, in some cases at least to spray a barrel of emulsion mixed with ammoniacal copper carbonate before the free oil wonld separate. In other cases the separation is more rapid, within a few minutes; it

would seem to be impracticable therefore to use this fungicide. If "soluble oil" or "concentrated oil" contains ammonia, it would be better that it should not come into contact with copper or brass, as the metal dissolved by the ammonia, however little, tends to decompose the soap emulsifiers. This does not apply to spray material ready to use, for the ammonia is so diluted and the time of contact so short as to have no effect.

The utmost care should be taken that all vessels used in storing or mixing "soluble oils" and their emulsions are clean. Most contents of barrels, except coal-oil, are likely to be hurtful; at least, it is safer to assume such to be the case. The greatest difficulty is found with tanks, pumps, and, in fact, all utensils contaminated with Bordeaux mixture or the lime-sulphur wash; it is not easy to clean such thoroughly enough to use with safety. Pumps should be well washed out with water, and only uncontaminated tanks and vessels, such as coal-oil barrels, should be used.

There has been much discussion concerning the value and efficiency of miscible oils, especially as compared with lime and sulphur. Each remedy has had its champions and its opponents, with an ever-increasing class who admit the virtue of both and who use both. It would seem that it is hardly open to question now whether petroleum preparations, used in sufficient quantity and well applied, are efficient insecticides. The verdict that they may be depended on to "kill anything they hit" has come unsolicited from so many independent, intelligent and unbiased observers, that it must be accepted as true. Isolated failures, which are possible with any remedy, count for nothing as against so much positive evidence.

A further question concerns the supposed cumulative effects of oils, especially heavy oils on trees tested for a number of years with them. This is a serious question, perhaps not yet decided. But some of our best known entomologists and horticulturists advocate oils and owners of long experience continue to hazard their orchards by using them. It seems clear that oil sprays, if they have not come to stay, will at least remain with us for some time.

Another question of detail is at what dilution should they be used? This is more difficult to answer finally for several reasons. In the first place, several distinct bodies enter into these oil sprays besides petroleum oils, as soap, carbolic acid, and rosin oil. We do not know how much effectiveness to credit to each of these several agents. It is probable that some of them, at least, have an independent insecticidal value. In the second place, the petroleum oils themselves are effective in a very unusual degree, kerosene and paraffine oil differing perhaps as much as 2:1. In the third place some of these miscible oils permit the admixture of a considerable proportion of water—not only permit it, but sometimes require it as essential to a good emulsion; the amount of water is somewhat variable, and as the finished oil is measured with the water included, it is not quite definite just what amount of efficient material is used to make a barrel of spray liquid.

In general terms, however, the one in twenty proportion advocated at first for miscible oils seems to have been found too weak. It is doubtful if ardent advocates of the oils now recommend so great a diluton. Last year in Delaware, where the oils were well

tested on a commercial practical scale, the common proportion was about three gallons to a barrel, or one in fifteen or sixteen. This year the same fruit growers have increased the proportion, using about one in twelve. This is about one gallon of petroleum oil to about fifteen and a half of spray liquid, or one gallon of petroleum and rosin oil to fourteen and a half of spray liquid.

It is probable that this increased strength has been found advisable. Undoubtedly this is a place where over-economy is poor economy, and one gallon of miscible oil in twelve of spray mixture, may, in the light of several seasons' experience, be considered a safe, conservative rule.

The cost of miscible oils, i. e., of the material only, differs considerably with market fluctuations, and with the particular type of oil, and with the accessibility of the supply, in the case of crude oil, at least. The one considered the best, made with paraffine oil, is the most expensive. This we have made for sixteen and a half cents per gallon, exclusively of added water. This diluted in the proportion just indicated, would make the spray liquid cost 62 cents a barrel, or $1\frac{1}{4}$ cents per gallon. Crude oil mixtures are cheaper, but seemingly not quite so efficient, and hence, perhaps, not really cheaper in the end. Kerosene emulsions for summer spray may cost about 10 cents or 12 cents per gallon for the miscible oil itself.

As compared with lime-sulphur washes, miscible oils have certain advantages and certain disadvantages. This is a question on which there is considerable difference of opinion.

An advantage in the oils is ease of preparation,—a statement that may cause surprise in view of the complicated processes, the greater number of materials, and, that too, materials not always of uniform quality. Prof. Phillips, Virginia Bulletin 179 says:

"It is not quite as troublesome and disagreeable to make soluble oils at home as it is to make lime and sulphur."

The newly advocated concentrated lime-sulphur preparation may change the comparison materially, but as heretofore most or at least half of the lime-sulphur preparations pumped had been previously boiled, certainly an extensive operation, and one requiring no meagre equipment. But each gallon actually boiled in preparation of miscible oils should provide for about 170 gallons, or from three to four barrels of spray material. Thus a moderate amount of emulsifier, made at a single boiling, taking one hour, might suffice for 100 barrels of spray material.

Many admitting the value of miscible oils will question the practicability of inexperienced persons trying to make them. If they are as uncertain and capricious as they seem to be in practised hands, what prospect of success will a novice have?

There is much in the argument, but it is one that each must answer for himself. As a matter of fact, some men not previously skilled in such matters, have made miscible oils successfully one year, and returned to the work the following year. The saving is considerable, though it would hardly pay the small user. These oils were designed to be made domestically only by large consumers or by operative bodies, as Grangers.

The main difficulty, perhaps, is the getting of good materials. These are not to be had of the local dealers, at least at present, and must be purchased in quantity to obtain economical rates.

Lime-sulphur here has a distinct advantage, as the materials are everywhere to be had. Probably the same would be true of the materials needed for the oils, if the making of them were to become general.

A particularly pertinent question here is. Is it wise to use the time of Farmers' Institutes in teaching technical processes, such as those referred to?

I believe within limits it is wise. I believe that there are certain facts that should be understood concerning emulsions, whether by makers, or merely by users, and that such facts are a profitable subject of instruction for institute workers. The highly organized diversion of labor found in cities, is not always practicable in farm work. The farmer has always been a man of many trades, and probably necessarily so. Scattered as farmers are, expert specialists are not available, as they commonly are manufacturers. Economic theorists would advocate that each man should do the one thing he can do best and satisfy his needs by exchange. But we all know that theorists are not always safe guides. Last year a co-operative body of men made about 80 barrels of miscible oils for their own use. We estimated the saving at about $1,000. I should think that several men might prepare the amount of oil within two or three days.

A further reason is that miscible oils lend themselves readily to adulteration with water. They are the only substance I know of that appears stronger and richer in proportion as water is added. It is not certain just what is in an oil that is bought, though several well-known makers are unquestionably honest, and furnish reliable preparations. Uniformity of results is dependent on uniformity of remedies, and this is perhaps best secured by knowing absolutely all the ingredients used.

Some commercial oils are unquestionably efficient and reliable, but just as unquestionably, many samples of home-made miscible oils are fully as efficient and reliable.

DR. FUNK: Doctor, one moment: Is there free arsenate in connection with this?

PROF. PENNY: I think not; it would make arsenate of lead.

DR. FUNK: If it had arsenate of lead, would it be effective if mixed with the lime and sulphur?

PROF. SHAW: In my estimation it would not; in changing the arsenate into a sulphide, it would be an acid solution, while the lime and sulphur is an alkali, so I do not think it would be effective.

DR. FUNK: It changes the color a good deal.

PROF. SHAW: We do not know what is happening when the change takes place, but as soon as it is thrown down, then we know. I do not suppose arsenic loses any of its qualities at all.

DR. FUNK: Mr. President, I would like to ask whether the Professor has had any experience with lime and sulphur as a summer spray?

PROF. SHAW: No, sir; I have not; the experimental side is the farmers' side; it is a little out of my line.

DR. FUNK: The reason I asked is because I am using it in my orchard this summer. I began last week to spray a thousand trees, and I propose to use it on apple and peach trees.

The CHAIRMAN: Ladies and gentlemen, we have heard about every crop that is raised on the farm, with one exception, and that is the most important of all—"The Man and Woman Crop," and now we will have the pleasure of listening to Mr. H. W. Collingwood, Editor of the "Rural New Yorker," while he tells us about that crop.

Mr. Collingwood spoke as follows:

THE MAN AND WOMAN CROP.

By H. W. COLLINGWOOD, New York City, N. Y.

A good friend of mine looked over our program and said "You have the post of honor—the only subject upon which one can preach a sermon." I am not so sure of that, for there are men in this list who are capable of preaching a sermon from any subject. There should be at least one sermon, and though I am poorly fitted, I will try it.

If a text were needed, I would take that great story from Luke, of the rich man whose lands brought forth abundantly. That man was evidently a good farmer. Had he lived in this age he would have been an Institute speaker. His farm would be fully drained, his barn stuffed with alfalfa, and his yard with pure bred stock. Perhaps he, too, would be like many successful men who have won success by their own strong efforts—a little boastful that he was well provided for. You remember what he said:—

"And I will say to my soul—soul, thou hast much goods laid up for many years; take thine ease, eat, drink and be merry.

But God said unto him, Thou fool! this night thy soul shall be required of thee; then whose shall these things be which thou hast provided?"

I shall therefore take as my text:

Whose Shall These Things Be?

What things? Measured by dollars, the farm output of Pennsylvania is enormous. You raise over $70,000,000 worth of hay alone each year. Put up in money values, the figures are almost beyond belief. What is more, the materials which you and other workmen take out of the soil give the value which builds your cities and keeps humanity alive and at work. That is true, yet those of us who have gray in our hair know that twenty years hence all this material prosperity will be as a tale that is told, unless we are really mindful of that text—"whose shall these things be?"

Now, by the "man and woman crop," I mean the human life and what it stands for on our farms. There is no way in which we can touch the future permanently, except through the children. The child is a little package of love and hope which we offer to

the future. We try to squeeze out the mistakes we have made and to pack in what we ought to have done and lay it on the altar of our country as the best gift we can bring. Do you realize that most of us who are here cannot expect to touch the future with the large affairs of life? If we touch it at all, it must be through the little, humble things that make up a common life. I fear that many of us in our efforts to teach and to help what we call agriculture, often shoot too high in the air.

When I was a boy I lived in a little sea-coast town near Cape Cod. A wharf was built by driving piles deep into the mud. The men who built that wharf measured as well as they could the mighty power of wind and tide and floating ice. These were the things that broke down a wharf, and to stand against them they drove the piles down deep. But in spite of this planning and fancied security, the wharf went down. They measured the power of the great destructive forces which they understood and were able to hold them at bay. Yet while they were figuring on these mighty things, a tiny worm which they did not consider was boring through these piles and slowly destroyed them.

Now I have come to believe that in much the same manner we are in an agricultural education building securely against the mighty destructive forces and yet neglecting the deadly smaller ones. I believe that in trying to give the State a quick show for its money at the Institutes, we are trying to put the dollar, the corn crop and the hay crop above the man and woman crop. There can be no doubt that agriculture, education and development are fitting our nation to buy the rest of the world, if need be, to fight it, if necessary, or to feed and clothe it. Jut as was the case with that old wharf in the old town, we need not fear the great forces which might destroy, for they can be measured. If we are neglecting anything, it is the little worm, the smaller influences of character and home, which are vital because they cannot be measured.

I think that at our institutes, our public meetings and at our schools and colleges, we should try to dignify our business as well as to make it more profitable. The world, as it stands, does not need our money half as much as it needs our manhood and our children. We need new methods of farming. I assume that the best way to arouse the spirit and ambition of the average man is to bring more honest money into his business. That is not all, however, for we need new ideals of farm life and living. In old days when a man child was born, the babe was welcomed, because here, they said, was another soldier to fight for the king. Many a mother grieved in her heart in those old days because her boy was born to be offered up as a human sacrifice, not for liberty, not for country, but for the king. The ideal has changed now, and I think most mothers dream of their boys as lawyers or doctors, or professional men. I would have you men and women of the Farmers' Institute labor to have this ideal changed again. I would have the mother plan in her heart that from the cradle her boy shall be trained for a farmer.

Whose Shall Those Things Be?

Now let us, as plain country people, throw aside the artifices of life and get down to the real truth and aim of livng. We toil on

our way with more or less ambition. Suppose we say that we gain the great aim of our kind. Stripped of the non-essential things, what is it except wife and child and a piece of land? No one ever gets more than these. Most of the sadness and failure comes from the lack of one or more of them. You and I know that life, of necessity, teaches us the beginning of many things—the end of none. Any farmer who sees the seasons come and go, and who sees through the years how God writes a message for good or ill upon his fields cannot measure his work and his planning by corn or stock or money alone—though these may be the essentials of success. That man knows, for it must come to him every time he stops to think, that, after all, the best legacy he can leave is the hope that his farm may be carried on as he would have it done. Whose shall these things be? Not the money Pennsylvania leaves to the next generation—not the produce in your barns, but the experience, the insight into life, the trust in God, the hope and joy of labor and the ambition to make your farm more productive and useful than ever? You cannot give your children anything better than these things. You can not pass them along unless there is spirit in your work—unless the man and woman are first on your farm.

I wish sometimes that I could have the power to glorify the dull, hard lives of men and women who serve their country in humble places. That is where the so-called classical education has an advantage over our modern system of doing things. The strong man may sneer at poetry and history, yet they may help and solace in time of trouble. One dangerous tendency of modern education is that it is too material and is crowding the spirit and reverence for true character out of life. Give me the power to make men and women of humble life recognize their real heroes and I will change history for the best. I remember how just after the Spanish war, every speaker seemed to think he must mention the charge up San Juan Hill. I heard it at dairy meetings, at hog meetings, fruit growers associations, a convention of nurses, and at funerals. Right within sound of the voices which shouted such praise there were silent men and women who had for years carried burdens of home life which would put the soldier to shame. We do too much chasing off into the next country for heroes to worship, when the living and the near at home demand our attention and our respect.

I know a woman who was left with seven children on a twenty-five acre farm, and with a mortgage. Her husband's last words were "go on as I have done!" I can safely say that most men left in such a way would have wilted and spoiled the family. The woman took up the burden alone, ran a dairy farm, kept her family together and made them all useful citizens except the eldest. He was lazy and careless and did not work. Finally that boy fell sick, and an instant operation was needed. The woman took her little savings from the bank and sent this boy to the hospital. Not content with that, she walked each day from her farm so that she might sit for an hour with her boy. When I asked her why she did that she said "I wanted my boy to feel that he never could got well if his mother had not been with him." She wanted that boy to feel that not only life itself, but all that life is worth, came from her. You need not wonder that the boy made good. Compare the work of such women who give life and spirit, with that of the soldier, whose business it is to kill. I

presume that every one of you Institute workers find it necessary in your lectures to go to history at times for examples of bravery or strong endurance. Let me ask you to try an experiment next winter. Cut out all the soldiers, the Captains of Industry, or other so-called great men, and take your examples entirely from humble lives who have tried to serve their country as this woman did. Try and make your hearers know and understand that such lives are to be emulated rather than so-called great ones. Such a winter would leave its mark upon the history of Pennsylvania. The man and woman crop would be the better for it.

I know another woman in this State who determined that her children should have the best foundation in education. It could only be obtained for cash. The husband lost his job and they moved to the country where the man drives a milk wagon. That woman was born in Europe where she was taught gardening by her father. In order that her children might be taught as she wanted them taught, she hired a piece of land, manured it, had it plowed and harrowed, and is growing vegetables as only the foreigners can. In this way she is earning enough to give her children what they need, and those children are to be trained so that they will be good farmers.

I could give you hundreds of instances where farmers and their wives have done and are doing just these things in order that their children may have education and hope. Can you not see that such men and women could not and would not labor in this way unless there was some love and spiritual power back of it all? Can you not see further, that there are thousands of farmers back among the hills, yes, and in the rich valleys, who need this very spirit kindled within them? I sometimes think a farmer is not unlike a gasoline engine. Strong and willing and ready, he stands waiting for the electrical spark to explode the gas and give the needed power. You will make a slow and feeble spark if you simply try to connect the pocket book with a larger corn crop. Turn to the man and woman crop and see what follows. There is not a school or college in this State which cannot show students whose very presence there represents a family sacrifice. Father, mother or sister, gave up something that was dear to them in order that the boy or girl might have a chance. I do not know anything in this world finer than the sublime faith in what we call education, which prompts humble men and women to practice self-denial in order that their children may go to school. And there is no sadder tragedy in life than when such men and women find that the influence of the school or college has made the child ashamed of father's honest toil. That is a tragedy because father feels that his love and his toil have turned to dust and ashes at the touch of modern education.

You see I would put the man and woman crop first of all. These people who deny and toil in order that the best of life may go to their children are worthier to be called heroes than those who do the so-called great things of life. It is from the man and woman crop that what we hope for in the future is to come. God ever calls the leaders—those who go on the cross and do the great things of the world, from humble walks of life—the farm, the shop, the sea—wherever men work with their hands, and for the large part in silence. It has been ever so since David was called from his sheep to lead a nation, or when the Great Master of mankind went from

the carpenter's shop and took so many of his helpers from among fishermen and farmers. It will ever be so. Forever the farm must not only be a factory and storehouse for food and fibre but for human character and honest manhood as well. The so-called wealth of the farm—the grain, the fibre or the food, all serve their purpose and pass on into other forms, but the man and woman crop—the human flesh and blood—endures to carry out the great mystery of living and the great problems of life.

Let me tell you why I think it is that God oftenest finds the strong and enduring qualities which make leaders out of men and women, in humble places, and more especially on the farm. I think there is a good reason for it, and it has a bearing upon our work for farm education. A well ordered farm home contains of necessity the humble and enduring virtues. A man to succeed on a farm must be industrious, thrifty, sober, careful of his reputation, firm, observant and independent. Enlarge these qualities and analyze them, and you will find the very things which great men must possess. The child cannot possibly acquire these qualities in town so well as he can in the country upon a farm, under the constant eye of his parents.

The home ties, too, are stronger where home means all that is worth while to the family—of comfort, study, fun or business. On the farm father, mother, sister and brother are bound together as they cannot be in town or city. It is much the same with true patriotic feeling. I make the statement with confidence that no real reforms in this country have ever been started and carried through from town and city. These things, the desire for freedom and fairer place in the world are born amid the solitude, wrought out by silent workers in lonely places, by men who slowly think out right from wrong while they work, with their hands. And it is much the same with deep religious conviction. God speaks through Nature to the farmer, the fisherman, or those who brave dangers or labor in silence to overcome material forces. I do not think any man can take a poor farm, upon which some one has failed, and restore it to strength and fruitfulness, without absorbing, perhaps unconsciously, a deep religious conviction.

These things and more show why the man and woman crop upon our farms must supply a vital need of the world. I speak of them because you Institute speakers and workers represent a form or farm education which is closest to the farmer. The college and the station stand off at arms' length. You meet him face to face. You will make a great mistake if you fail to make much of the home. Many farmers believe in homes. They will drain a field to make a good home for alfalfa, put up a fine barn to make a home for cattle and horses and give the herds and the hogs all the comforts of home, but stop there! It is your business to keep them going with this home proposition—right into the house. I had a man tell me once that he believed in making the best possible homes for the stock, for that brought in money. He was afraid if he put corresponding comforts in the house his children and wife would become lazy and soft. That man explained to me a fine plan for piping water to the barn, so it was always before the horses. When I asked him if the water was piped to the house, he said "No; the women can go to the well;

they need the exercise!" Now it ought to be your chief business to study how to make such farmers see that the human home is the most important of all.

Perhaps some of you have read "The Octopus." In that book is a German character called "Bismarck." This man was ever talking about the Fatherland and how he would go back to it. He finally married an American girl, bought a small piece of land and made a home of his own—becoming a citizen. He had no more to say about the Fatherland and some one joked him about it. Here is his answer: "Der Faderland? You ask me vere iss der Faderland? Were my home iss—vere I work mit my hands to earn the bread for my wife and family—vere I build the roof to shelter dem—dere is der Faderland!" I tell you that this ignorant German had in his heart the true philosophy of living. I wish you men and women could have the same spirit as you go up and down the State into lonely places or to sad or discouraged people, so that you could carry the true message to them. Let us not go about our work hesitating, or with an apology, but say, as we must know, that the best things that go with farm life are those which are closest to the home.

PROF MENGES: May I say a word here? There are a number of manufacturing interests in this city. I had a little communication with the General Manager of the York Manufacturing Company, who are makers of ice-making machines, some of the largest machines in the world being made there, and Mr. Shipley said he would be very glad to show the members of this Institute through the establishment tomorrow afternoon about three o'clock. Tell him that you are from the Normal Institute assembling here in the Court House, and you will be permitted to go through their establishment, although he said I should be sure to tell you that in doing so it would be at your own risk. Now, if any of you get caught in there and turned into ice, that is your own concern.

Then, there are a number of very large manufactories of agricultural implements here, which are open to you, and those of you who desire to see the York County Fair Grounds can do so tomorrow afternoon, when the grounds and buildings will be open for your inspection. Take a car for the west end of the city tomorrow right here on the square, and simply say you want to go to the Fair Grounds, and also be sure to wear your badge when you go. I guess that's about all I have to say now.

The CHAIRMAN: You have heard the statements of Prof. Menges. I trust that as many of you as possible will avail yourselves of the opportunites afforded you in these invitations.

The program is now complete. Tomorrow morning the session opens at nine o'clock, until which time the meeting now stands adjourned.

Wednesday, May 26, 1909, 9 A. M.

Mr. Horace Seamans in the Chair:

The CHAIRMAN: The meeting will please come to order. In the absence of the first speaker on the program this morning, I will call on Mr. Hutchison to open the meeting with a few remarks in regard to the Feeding Stuff Law that was passed last winter, since the last meeting of the Institute.

MR. HUTCHISON: I am glad to see so many of you here, and I am glad for the assistance you gave in inducing the Governor to sign this important measure. This bill, which is now a law, is of great importance. We started out with the purpose of passing a law prohibiting adulteration of feeding stuffs. It had passed the House, but when it got into the Senate, it struck a snag. It prohibited the makers of these feeding stuffs from using weed seeds, oat hulls and so on. The large manufacturers of the West came on the scene, or their representatives did, and fought for permission to use the oat hulls, claiming there is about 2 per cent. protein in them and 1 per cent. fat. The result was that the committee in the Senate put in a clause allowing them to sell a feed having a crude fibre of not over 9 per cent., and if I am informed properly, it would allow for the makers of other concentrates to use about 20 per cent. of oat hulls. It is not altogether what we wanted, but it is the best we could do under the circumstances. When you come upon the Minneapolis people, with all their money—I don't want to say that they used it to buy votes, but to bring men here to state their case—it is not an easy matter to get through what you want. I had to let go on the 9 per cent. fibre, but I held them down on the corn products. They had been in the habit of grinding up corn cobs and putting them in wheat bran, wheat middlings, and everything else; under the old law they ground up corn cobs, oat hulls, rice hulls, peanut hulls, elevator chaff, and everything else and sold them under the name of "mixed feeds." They were worthless materials, but now they are prohibited from doing this, and from using corn cobs in anything except corn products, such as cornmeal, hominy or gluten.

I want to thank you for your assistance in this matter. It helped us carry the day even though these manufacturers were on the scene with a lot of money. Why, I have just come from the Northern tier of counties, where they sold a feed containing 40 per cent. adulterants. These people are called the Globe Elevator Company, located at Buffalo, and they employed a Baptist minister as their agent. He was innocent, but he went around among the people and sold them this feed. I will say this for him, when he found what he was doing, he was honest enough to go to these men and tell them what he had been doing; that he deceived them. That was all he could do, but the farmer had paid for the stuff. I collected $600 in fines from these people last week. Now, if when you want to buy a feed, you will take a sample of the feed, and send it to the laboratory with a dollar, it will be analyzed, and it may save you several hundred dollars. The only reason the dollar is charged is to prevent the laboratory from being flooded by people who have no real interest in the matter.

Now, I don't want to take up your time talking. The alfalfa question which comes up this morning should be of great interest to you

people. You should grow more of it in this State. I think it will pay you.

MR. CLARK: Mr. Hutchison, I want to ask you one question: suppose this feed is sold under a guarantee?

MR. HUTCHISON: Go back to the man who sold it to you.

MR. CLARK: That is, the man who sold it to you has to go back?

MR. HUTCHISON: Yes, sir; this law is for the State of Pennsylvania, and we have no jurisdiction outside of Pennsylvania, but we will do this; if you bring suit, we will help you win out, the same as we did in the fertilizer cases. If a man in this town buys his feed from a firm in Minneapolis, we cannot touch that Minneapolis firm direct; they are out of our jurisdiction; but we can bring suit against the man who sold the stuff, although that is a rather hard job.

This new law goes into effect the first of August. We are now distributing copies of it all over the State; we have already sent out over ten thousand copies. In this law bran and middlings come under the same law as the whole grain.

MR. YOUNG: Suppose you send for a carload of feed, and they send you a sample, but when the carload comes, it is not up to the sample?

MR. HUTCHISON: The safest way is to take the sample out of the car.

MR. STOUT: You say this law was passed by the agricultural committee; were these men sent to the Senate by farmers?

MR. HUTCHISON: Yes, in the House; I won't say anything against the Senate, but this bill passed the House with 187 votes, but in the Senate there are not so many farmers, or men in sympathy with the farmers, and there was work done by the manufacturers of these feeds. I hope they will send you there Brother Stout, and other men like you, to legislate for us.

The CHAIRMAN: Secretary Martin wishes to make an announcement at this time.

SECRETARY MARTIN: I wish to state to the members, that the State Board of Agriculture held a business meeting yesterday, they have some unfinished business that will require a few minutes; we will therefore have a recess in order that the Board may complete its work. The Chairman of the State Board will please take the Chair.

PPROCEEDINGS OF A SPECIAL MEETING OF THE PENNSYLVANIA STATE BOARD OF AGRICULTURE.

Held in the Court House at York, Pa.,
May 26, 1909, for the purpose of
Receiving Additional Credentials.

Vice-President Herr in the Chair.

The CHAIRMAN: At the suggestion of Secretary Martin, we propose to hold a short session to transact what business needs to be

transacted. There might possibly be some credentials that were not presented yesterday. Such credentials can be turned over to the Committee on Credentials.

Now, what other business is there before the Board?

SECRETARY CRITCHFIELD: I think there are some credentials which have not come into my hands, and which I am very anxious to receive. I wish the members who have not yet presented their credentials would do so at once.

MR. BLYHOLDER: Mr. Chairman, while these credentials are being presented, I have a resolution, which I would like to offer.

The CHAIRMAN: Mr. Blyholder has the floor.

Mr. Blyholder thereupon offered the following Resolution and moved its adoption:

WHEREAS, The foot and mouth disease has been eradicated from this State and our livestock owners have been protected from the great losses that would have resulted if the disease had been permitted to become established, and

WHEREAS, This result has been accomplished by the State Live stock Sanitary Board, with the co-operation of the United States Bureau of Animal Industry, in less time and at less expense than similar work has ever before been accomplished, therefore,

BE IT RESOLVED, That we express our appreciation of the work of the State Livestock Sanitary Board in stamping out this disease, and

BE IT FURTHER RESOLVED, That we also express our confidence in the ability and integrity of the members and officers of the State Livestock Sanitary Board.

MR. GOODERHAM: I second Mr. Blyholder's motion.

MR. BLYHOLDER: The reason I offer this resolution is no doubt apparent to the members of the Board. Some of the statements made here yesterday in good faith have gone out, and may be taken by the farmers of the State, who may read them, as meaning something they were not intended to mean. I therefore offer this resolution to corect any wrong impression that may have gone forth.

DR. KLEIN: If I am permitted, I would like to say a few words on the subject.

The State Livestock Sanitary Board was taken at some disadvantage yesterday in not having some representative here who was familiar with all the details of the work. I have no doubt but that the statements made here yesterday were made in good faith, but I believe it would be better for all parties concerned if a statement of facts referring to the points discussed could be presented from the records. There were some five points taken up; I was not present, but I had an opportunity of reading the stenographer's report of the discussion, and I get this information from the stenographer's notes.

It was said that many of the herds condemned in Clinton county were not affected by the foot and mouth disease. That a lot of

veterinarians were sent up to that section of the State who knew nothing about the foot and mouth disease. That these veterinarians hired liverymen to take them out into the country for the purpose of examining animals before giving permission to transport them from one place to another, and that besides getting good salaries, these men were running up large livery bills. That the quarantine restrictions were kept in force longer than was necessary. That the animals in some cases were appraised in excess of their value, and finally, that in some cases condemned cattle were slaughtered and buried on Sunday, and that the veterinarians held drunken orgies in connection with it.

Now, as I said, I just want to present you a few statements on these points. Our records show that the foot and mouth disease was found on five places in Clinton county; that the animals on these places were destroyed and buried. In order that you may understand how much care was taken that no mistake should be made in condemning animals, I will refer briefly to the methods followed not only in Clinton county, but in all sections of the State.

At Lock Haven there were two men stationed for the purpose of making a final examination, in all suspected cases; one of these men was employed by the State, and the other by the Federal government. Both these men were experienced in the foot and mouth disease. The State man had shown by his work before he was sent to Lock Haven that he was thoroughly competent to recognize the foot and mouth disease; the man from the United States Department had been all through the outbreak of the disease in New England, and was regarded by the head of the Federal forces in Pennsylvania as one of the most reliable men he had. Then there were several men in Lock Haven, sent out by the Government, who went from farm to farm to examine animals for the foot and mouth disease.

Now, this disease is not prevalent in the United States, and consequently, many of the veterinarians are not familiar with it. Now, that may have been the case with some of these men who went from farm to farm to look for the disease, but these men did not condemn any animals. If they found any animals with indications of the disease, they reported the case to the two men stationed at Lock Haven, and these men made an examination. In cases where the indications were not typical, but where they were suspicious, calves were inoculated, and kept under observation to determine whether they had the disease or not. This was the general way of investigating foot and mouth disease wherever it was reported to exist. This, I think covers the two first points mentioned in the remarks.

Another point was that the men at Lock Haven went out to examine cattle, sheep and hogs, to be moved from one place to another. That is correct. Early in the work, when we were in the dark as to the real situation, it was considered necessary that some control should be placed on the movement of animals from one place to another, and it was required that no cattle, sheep or hogs should be driven or hauled over public highways, or shipped from one point to another by rail, except on written permission from the State Live-

stock Sanitary Board. Later on it was found advisable to continue this restriction because it gave us complete information of the movements of cattle in any given locality, so that if the disease should appear on any given farm, we would be able to trace back all the animals that had recently been brought on that farm. That this restriction was advisable, is shown by the results. Although diseased or exposed cattle were brought into Pennsylvania, and distributed to 99 farms, the disease appeared only on two other farms, and it was this permit business that had as much to do with controlling the disease as any one thing. The permit business also enabled us to trace out quickly the two last cases of the disease that appeared in the State. On the 17th of January, on a Sunday afternoon, we received a telephone message from Lancaster that there was foot and mouth disease on a farm near that city. We had the man's name, and a record of every animal that had been taken to his farm. He appeared to be a man who dealt to some extent in cattle. We went over the records, and by means of that information, it was possible to go within twenty-four hours to every farm where these animals came from and examine the animals. We could not have done that if it had not been for this permit plan.

Nearly all of the men who gave these permits at Lock Haven were employed and paid by the Federal Government.

In regard to the fifth and last point, that the quarantine was kept up longer than necessary, it is entirely possible that a man residing in a certain community may form an opinion from local conditions that the quarantine restrictions are kept longer than necessary, but we cannot always decide such a question from a purely local standpoint. Consider the conditions that confronted the State Livestock Sanitary Board at the beginning of the outbreak. Four states were affected; three large stock yards where they shipped cattle all over the country, were infected, and an embargo was placed on all shipments to England, except from the port of Boston, so that a strip of 500 miles of country was involved. This was the situation.

I believe that most of you know that the disease in Pennsylvania came from the Buffalo stock yards. Eight carloads of cattle came into Pennsylvania and were distributed to various parts of the state before it was known that they were infected, in spite of the fact that the disease was discovered within three days after the first lot came into the State. In New England, the disease existed for four months before it was discovered. In Pennsylvania it was discovered within three days and stamped out of existence within five months' time. The State Livestock Sanitary Board started out in the beginning to examine all cattle that came in from the Buffalo stock yards from about the fifteenth of October until the day the disease was discovered. A large number of these cattle had been shipped into Pennsylvania into the various parts of the state.

In looking up the records, it was found that a large number of these cattle had gone through the Lancaster stock yards. A proper regard for the livestock interests demanded that this territory must be placed in quarantine, and the State Livestock Sanitary Board, placed it in quarantine, but only the infected portions of the State. The Federal government quarantined the entire State of Pennsylvania. They had to take into consideration the British government, which had quarantined every one of our ports but Boston. They

understood that if they did not do this, the British government would lose confidence in their work, and when we came to ask them to lift the quarantine from these ports, they would not have done so.

The State Livestock Sanitary Board induced the government on January 5th to raise the quarantine in the greater part of Pennsylvania, but it was only done after the State had agreed to extend its quarantine lines to some extent, and this was only done because it was believed that the greater part of the live stock interests would be benefitted by the change. On the 5th of January, the quarantine was accordingly reduced. The State Livestock Sanitary Board continually made representations to the Federal government of the lack of necessity of continuing the quarantine over certain areas. There was no disposition, whatever, to continue the quarantine on any particular locality any longer than was necessary, but the Federal government did not always see fit to make the concessions asked for by the State Livestock Sanitary Board, for the reason that they had to consider what the British government would think of their action.

Now, the attitude of the British government was also a matter of concern to many of the stockmen of Pennsylvania. At the time I am speaking of there was a large number of valuable steers of the highest quality of beef animals being fattened for the British market, and it was as much to the interest of Pennsylvania as it was of general interest to get this quarantine taken off the ports by the British government. This question did not only concern the owners of these animals to be exported, for it is a well known fact that the export market for cattle improves the market at home.

The quarantine was entirely taken off, and all of Pennsylvania except several townships in Lancaster county released on the 23rd of March, and I don't think it could have been done and accomplish the same result any earlier than this. So far as the State Livestock Sanitary Board was concerned, if it had had only local issues to consider, the quarantine could have been lifted much earlier, but it was advisable to take no action that would not meet with the approval of the Federal government, and it was advisable that the Federal government take no action that would not meet with the approval of the British government, and the advisability of all this care is shown by the fact that when the Federal government notified the British ambassador that the quarantine had been taken off, it was just eight days later that the British government took the quarantine off the ports.

It has been said that some of these animals were appraised in excess of their value. Only the name of one herd owner was mentioned. Now, I have here the figures of the appraisement of the animals in that herd. There were twenty cattle appraised and slaughtered. One cow was appraised at $30; one at $25; one at $25; one $40; one $45; one $20; one $40; one $40; one $25; one $25; one $35; one $20, a bull at $35; a yearling at $15; one cow $35; a yearling $15; one cow $35; one $40; one $30.

Now, the idea in appraising these animals was to give the owner a fair market value for his herd, so that he could go out with this money and replace these animals. That was the purpose in making the apraisement; one-third of the appraisement was paid by the State, and two-thirds by the Federal government. Now, the

Federal government also paid two-thirds of the expense of disinfection, and the salaries and expenses of their men. At one time we had in Pennsylvania 140 of these men. The number of men employed by the State never exceeded forty, and that number was only employed for a very short time.

Now, another point that should be taken into consideration in this connection—but there is another point that I want to speak of before I go any farther, and that is the statement in regard to the cattle being slaughtered and buried on Sunday, and the men indulging in drink. It is true that cattle were buried on Sunday. When the disease was found on a farm, it was the object to get the diseased animals under the ground just as soon as possible, and just as soon as the grave was ready to put them in, they were killed, and that occurred at times on Sunday. Now, the reason was this: when animals exist on the farm with this disease, there is great danger of the disease being carried to the surrounding premises, and the very reason there was for destroying these animals and burying them as rapidly as possible, was also the reason for doing it on Sunday, if that happened to be the nearest day. We also had to work on Sunday. Our office at Harrisburg was open every Sunday. We had to do it because we were receiving telephone messages right along and had to have some one there to receive these messages. All outside work that could be suspended was stopped, but there was work that could not be suspended. It had to be done.

Now, in regard to the drinking, I want to say that personally I have no knowledge on that point. The one man we had stationed at Lock Haven complied promptly and properly with all the orders we sent him by mail, and I talked with him very frequently by telephone, and so far as we have any information we do not know that that man indulged in drink. Of course, in a case of this kind the State Livestock Sanitary Board must necessarily be dependent upon the citizens of the community in which these men are, for information regarding their conduct, and if any complaints had been sent to the office while these men were working there, I am quite sure that any man employed by either the State or Federal government, not conducting himself properly, would have been taken out of the work. I want to say that I was employed by the Federal government for five or six years myself, and I am familiar with their requirements, and they will not stand any nonsense.

Now, there is one other thing that I want to call your attention to, and that is this fact that it took England fifty years to get rid of the foot and mouth disease. That was the first country to adopt the method of slaughtering diseased animals. They fooled along with quarantine restrictions for fifty years without getting rid of the disease, and then they began to slaughter them. Germany has been fighting it for thirty years, and the loss to that country in that time was $150,000,000. In the outbreak in New England, it took the State authorities and Federal authorities eight months to get rid of the disease. In Pennsylvania the disease was stamped out in about five months; the first case was reported on the 6th of November, and the last case found in Lancaster county on the 17th of January;

the quarantine restrictions were continued for a time afterwards, but all of the quarantine restrictions were off five months after the disease was discovered. That is the record in Pennsylvania.

The CHAIRMAN: Gentlemen, I wish to call your attention to the fact that we are encroaching on the time of the Farmers' Institute, and any remarks you make must necessarily be brief.

DR. KLEIN: I am through, and thank you for the time and attention.

The CHAIRMAN: I would have nothing to say if I had not been misquoted. The inquiry I made was in regard to tuberculosis in the human family, and it was turned over to the animal family, and in the course of the discussion I gave my opinion regarding the way things were done during the outbreak of the foot and mouth disease in our county. I simply voiced the feeling of many of the best citizens, and did not speak for publication. Nor did I utter one word of censure against Dr. Pearson. He has my highest respect and regard. I may not have spoken wisely, because I was not speaking for publication, but the reporters got it wrong in the newspapers, and therefore I wish to say that I wished to make no complaint or cast any reflection on the State Livestock Sanitary Board. My remarks against graft were confined entirely to some of our local citizens, who were anxious—at least it is commonly so reported—to have their herds condemned. I did not wish to make a public example of Mr. Martin, and I hope it won't be repeated. It was reported by people there that the herd was in very poor condition, and that he had received a price for his cattle, far in excess of their value In the other case where I asked them to let the stock be held until Dr. Pearson could see it, it was pronounced not foot and mouth disease. In regard to the number of Veterinarians in our county, I do not know how many were there; I saw and talked with two of them. I simply referred to this matter as an indication of the graft that exists not only in connection with this, but with other things in Clinton county, and other places as well. This is the day of graft, and I hope this will bring out an investigation.

I can thoroughly endorse the sentiment of the resolution, and can afford to vote for it freely. I have full confidence in Dr. Pearson and the State Livestock Sanitary Board, and when the vote is taken on this resolution, I shall vote in favor of it.

A vote was then taken, which unanimously endorsed the resolutions.

SECRETARY CRITCHFIELD: Now, Mr. Chairman, if there are any credentials I should like to have them, so that we may adjourn, and let the Normal Institute resume its work.

The additional credentials having been gone over and found correct, the Board adjourned.

After the adjournment of the special meeting of the State Board of Agriculture, the Normal Institute resumed its session, with Mr. Seamans in the Chair.

The CHAIRMAN: I have a list of delegates here from the Norristville Farmers' Club: they send the credentials of the following gentlemen: Mr. Thomas W .Brown; Dr. Vallis Hawkins, and Mr. Payne Norris.

In accordance with the action taken yesterday, these gentlemen are entitled to the privilege of the floor, as are any others, who may wish to take part in the discussion.

PROF. MENGES: I have a letter from the Mayor of the city, in which he states that he is very sorry that he was unable to be here yesterday to welcome you to our city, but that was very well done by the Judge. The Mayor says he would like to shake the hand of every man here from all the different counties of Pennsylvania, and bid him welcome.

The CHAIRMAN: We will now take up the regular program of the morning; the first topic is "Alfalfa; Its Importance As A Feeding and Fertilizing Crop For Pennsylvania," by Prof. Agee, of State College

SECRETARY MARTIN: I wish to say that we are in receipt of a letter from Prof. Agee, saying that owing to a special pressure of work he is unable to be with us this morning; but he has sent his paper to be read by Mr. Peachey. If possible, Prof. Agee will come here before we adjourn to say "how do you do" to you all. Mr. Peachey will read his paper, and then deliver his own address on Alfalfa.

The CHAIRMAN: Then I will have to introduce to you Mr. Peachey.

Mr. Peachey read the paper of Prof. Agee, which is as follows·

ALFALFA IN PENNSYLVANIA.

By PROF. ALVA AGEE, State College, Pa.

Director Martin has asked me to discuss the importance of alfalfa as a feeding and fertilizing crop for Pennsylvania and then my friend Peachey will tell you how to grow it.

Some good people are affirming that all this talk about alfalfa is wasted effort in Pennsylvania. They believe that the crop has no importance for our state because it cannot be grown successfully. There have been a great number of failures—no doubt about it—but these failures were largely due to our ignorance and not to any inability of alfalfa to grow if given a square deal. The proof of this fact is found in the existence of prosperous fields of alfalfa on a variety of soil types under our eastern climatic conditions. The plant does grow under Pennsylvania skies and all it asks is that it have drainage, fertility, lime, inoculation and a good seed bed, where it can have moisture and freedom from pernicious grass the first year.

A recent circular issued by the Ohio Experiment Station contains this statement: "Alfalfa is being grown with more or less success in every county in this state; with greater success upon the rich and well drained limestone soils of the western half than upon the shale, clay and sandy loams of eastern Ohio, although under these less favorable natural conditions success has been obtained by many." A similar statement may may be made for our own State.

Alfalfa would have no importance for us, regardless of the matter of the feeding value of a ton of alfalfa hay, if it would not grow on our farms. It is growing and can be made to grow on a very considerable acreage within our own state lines.

Our next consideration is its actual feeding value. On this point I can render the best service to you by quoting from Dr. Hunt's book on "Forage and Fiber Crops in America," which occupies an authoritive position in our agricultural literature. It says, "A table based upon the twelfth census and American analyses and digestion experiments, shows that in 1899 there was produced in the United States, about the same quantity of alfalfa hay as of red clover hay, off of about one-half the area, and that the yield of digestible nutrients was from two to two and one-half times that of red clover; while the digestible protein in an acre of alfalfa was three to four times that of red clover, and about ten times that of the cultivated grasses, on the basis of the composition and digestibility of timothy hay."

Experiments have demonstrated that the composition and digestibility of alfalfa are quite similar to that of bran. It is a safe statement that one ton of alfalfa hay is equivalent in feeding value

to four-fifths of a ton of bran. Dr. Voorhees at the New Jersey Station has shown that nearly seven tons of cured hay may be produced on an acre of land in our Eastern States, when conditions are made entirely favorable. One-half of that yield, or three and one-half tons per acre, should be a low average yield on Pennsylvania farms, and if each ton is equivalent in feeding value to four-fifths of a ton of wheat bran, as scientific experiment has established, the importance of this crop for Pennsylvania is beyond question. Our agricultural leaders are right in their continued insistence that farmers learn to grow alfalfa successfuly, because the relative value of alfalfa as compared with timothy and clover, cannot be ignored by farmers whose product in milk and meat must be marketed in competition with producers from other states who will learn to grow alfalfa extensively.

Director Martin has reqested that the fertilizing value of alfalfa be discussed. One of the best examples of the use of alfalfa as a means of maintaining soil fertility, may be found on the farm of our friend Joseph E. Wing, where, in four or five years rotation, the alfalfa sod produces immense yields of corn. This legume provides a soil with a large amount of organic matter and with supplies of nitrogen, and performs the same office as red clover. When mineral fertilizers are freely used, maximum crops always are possible on an alfalfa sod.

The CHAIRMAN: Mr. Peachey will now continue to address you on "Alfalfa; how to grow it successfully."

Mr. Peachey's address was as follows:

ALFALFA: HOW TO GROW IT SUCCESSFULLY.

By J. H. PEACHEY, Belleville, Pa.

The value of Alfalfa—"The Best of Fodder," has been practically demonstrated by Prof. Agee. It would be difficult to over-estimate its value as a forage crop. Truly it is the most wonderful plant in existence. You have learned what it is. I have the difficult task of teaching how to secure it. To have and to hold is the problem. My experience, limited to four years, directed by what I have gathered from other sources, will compose the subject matter of this article. So much has been published in book, bulletin and paper, that to gather the best information from the best authorities, would be impractical upon this occasion.

The soil, the all important factor in the problem, will first engage our attention. If soil is adapted to the plant, success is more easily obtained. Therefore a knowledge of the life history of alfalfa seems necessary. When we know the characteristics of a plant, we can work more intelligently. Alfalfa, being a dry weather plant, or one that succeeds best where the average rainfall is considerably

less than in Pennsylvania, is not adapted to a wet soil. It cannot live in a soil where water excludes the air. Dig a hole in the ground several feet deep, and if water stands in it, alfalfa refuses to grow. The roots cannot come in contact with the soil air, and must necessarily perish. Some one has said that it will not grow on high ground. My experience teaches differently. One of my fields is on a hillside, almost the highest point on the farm. The growth is comparatively good. The soil is flint underlaid with limestone. At several places the yellow limestone clay comes to the surface. Here the growth is apparently as good as elsewhere. The subsoil is reasonably porous.

Condition of soil is apparently more important than type of soil. Humus, fertility, available plant food, are all essential. Experience favors liberal applications of lime, the quantity depending somewhat upon the acidity of the soil, and its physical condition. These varying conditions may be largely determined by the crops previously grown. The plant itself, when carefully studied, can tell its story, or in a measure at least make its wants known.

For the benefit of the beginner in alfalfa culture, we become more specific. Study the plant. Select an acre of the best soil you have. Let that be a potato patch, or corn field, where weeds have been destroyed the previous year. A good clover sod could also be selected. Manure it heavily. Plow it well and early in spring. Harrow thoroughly, pulverizing well. Apply fifty bushels of stone lime to the acre. This may seem excessive, but it cannot do injury to an alfalfa crop. Harrow with smoothing harrow about every ten days, or whenever you notice the appearance of weeds. Cut the soil shallow. Deep harrowing will bring seeds to the surface, that otherwise would be dormant. Continue thus until latter part of July or first of August. This should insure a well-prepared seed bed. A few days before seeding, apply about four hundred pounds of a good complete fertilizer. This can be done with grain drill. If you can secure several hundred pounds of soil from another alfalfa field, do it, distributing it in the latter part of the day and harrow immediately. In getting soil, remove an inch of surface soil, and take several inches beneath. Do not expose this inoculated soil to the hot rays of the sun before applying to the field. Do not say that an application of inoculated soil is absolutely necessary, but it is a means to an end, and there is wisdom in securing the best condition possible. Do the best we know and leave the rest. My faith in innoculated soil from alfalfa field, is considerably stronger than in those commercial cultures, sent out by the Department of Agriculture. While I am free to credit to them full value, it seems reasonable to believe that when all other conditions have culminated favorably, alfalfa will care for itself. In other words, inoculation will not regulate difficulties that pertain to soil fertility, or create favorable conditions when good culture has been neglected.

Concerning the seed, get the best, regardless of cost. Patronize good, reliable seedsmen. Have seed tested for germination. Be sure that it is free from all noxious weed seeds. Remember that weeds and grasses are the persistent enemies of alfalfa. Prevention, like in all things else, is better than cure.

Time of seeding will vary with latitude. Prefer August 1 for Central Pennsylvania. Sow twenty to twenty-five pounds per acre.

Quantity of seed will depend upon vitality and per cent. of germination. It pays to sow plentifully. Sow with seeder, one-half of amount each way to insure equal distribution. Cover with smoothing harrow. Seed at this season of the year should be covered at least two inches. I prefer the above method of sowing.

Considerable alfalfa is sown early in the spring with a nurse crop. Have no personal experience with this method. What knowledge I have of this has been gained from observation and study. Were I to sow by this method I would sow it with barley exclusively. Barley is an early maturing grain. It does not have an abundance of leaves to shade the alfalfa plant. For these reasons it is better adapted to this manner of seeding than oats. Sow a bushel of barley to the acre, and twenty to twenty-five pounds of alfalfa. Do not allow the barley to ripen. Cut it when grain is advanced to the milk state, make hay of it, or if small growth let it lie on the ground as a mulch. If allowed to ripen it will rob the alfalfa of moisture necessary for its continued growth. Remember the barley must be subservient to the alfalfa, if the latter shall be a winner.

During the first year's growth we clip the alfalfa plant. Time will vary with the season. If plants show indication of decay or premature ripening by turning yellow in leaf and stem, we clip it about four inches from the ground with the mower, leaving it evenly distributed over the ground. This revives the plant, develops a stronger root system, increases number of stems to the individual plant, giving it that beautiful green tint, so desirable in vegetation. It also destroys many weeds, that otherwise would prove injurious to the alfalfa. Refrain from clipping early enough in the season, to allow sufficient growth for protection during the winter. The exact date cannot be given. Judgment must be exercised in order to secure best results.

Another consideration is proper time to cut for hay. Just when a few blossoms appear is not at all times satisfactory. The other end of the plant needs to be consulted. Examine the plant carefully, and when the little sprouts have made their appearance, giving evidence of a future crop, cut it. We mow in the morning after the dew is off, sometimes following immediately with the tedder. Never use tedder when alfalfa is dry. You thereby lose leaves, which are the most valuable part of the crop. When it is wilted a little we rake it in windrows. We cure it in windrows also. We turn it occasionally while yet damp, just rolling it over. All our efforts from first to finish, are directed toward saving the leaves.

This manner of curing usually takes three days. We begin piling when yet a little damp. Do not want water on it, only somewhat tough. Hay is put in barn before it is thoroughly dry. We do not want it to break. Unnecessary to have it perfectly dry. The moisture in the stalk will not injure it. It is moisture on the outside that causes trouble. If put in mow in proper condition it comes out with leaves and stems united. When too dry it breaks the stem in handling and leaves fall off. It becomes brittle and dusty. Stock does not eat it so readily.

Have no experience in the use of hay caps. Am gathering information preparatory to using them this year. From what I learn from others it is the right principle. No question whatever, that hay cured in cocks under cover, will contain more feeding value than

when sun-dried. By this method but little loss is sustained by unfavorable weather. We once lost one crop because of rain daily for a week after cutting. At least three tons of alfalfa hay so badly injured that it was considered worthless for feed. Those three tons would have purchased a large quantity of material for caps. It would have been a safe investment—money well expended.

To the farmer who may peruse these lines, allow me to say that alfalfa is the most wonderful plant in existence. Did you fully realize its value, you would get the alfalfa inspiration, and get it awful bad. To you I say, select an acre of your best soil, the more nearly adapted to alfalfa the better. Manure it well. Plow it well and deep early in spring. Harrow thoroughly. Let it lie until weeds start. Harrow shallow. Make perfect seed bed. Continue thus until August 1. Apply fifty bushels lime. Secure soil from alfalfa field—several hundred pounds. Sow this immediately before sowing seed. Drill several hundred pounds complete fertilizer. Sow twenty-five pounds good alfalfa, one-half each way. Follow with smoothing harrow. Exercise your best judgment from first to finish. Follow the old colored minister's advice to his congregation, "Take hold, hold on, and neber let go." You will grow alfalfa.

A Member: How high from the ground do you let the alfalfa grow before cutting it?

MR. PEACHEY: About three or four inches. Now, another thing about the cutting. Sometimes some of you will cut it when you see about one-tenth of it in bloom; well, you may wait some years until the frost comes before you find one-tenth of it in bloom. The best way is to go into the field, and stoop down and look for the second growth. If that is pretty well started, it is time to cut it. In a few days it will be nice and green. If you cut it before that time the hot summer sun is likely to injure the coming shoots.

MR. GOODERHAM: I would like to ask the speaker if he would make any difference in the size if he used it for hay?

MR. PEACHEY: Yes, sir; if I want it for hay I want all the length I can get, and I try to get a good strong root system so as to get more branches. You take even the common red clover, and it will develop better if you have a good, strong root system. Now there is some alfalfa here; I was going to bring some of my own, because maybe somebody won't believe that I have any. That doesn't make any difference particularly. I have three acres since five years ago last July. It is doing very well. I planted another patch last August, and then a dry spell came along, but the latter part of August it was the greenest thing in that section of the county, where the only green things were the alfalfa fields. It came out all right. I did not cultivate it last fall because it did not make growth enough, but this spring! It looked fine in March; the cool weather injured it some; it would surprise you to see how that alfalfa would change color with the weather; on cool days it did not look so weak, but just as soon as a nice warm day came along, that alfalfa was so nice and green. Here is a plant that I believe is four years old. It is said that it has ninety stems. I have heard of a plant having a hundred and sixty. Now this plant does not have as large a root

as I could show you, but I believe the party who grew this could show you larger roots. Here is another that I believe is one year old.

MR. WATTS: Both of them are the same age; the larger plant was sown in the clover planting at hay time; the other was sowed in the same manner, but that field was plowed last summer, and it is still growing. The one that has so many roots was grown last summer right in with the clover. We find it best to grow it right in with the clover.

MR. PEACHEY: Some years ago I sowed some in with common red clover, but three years ago we planted it with the corn. Then the hired man came along with two good horses; they came to the alfalfa and stopped; he spoke to them; they wouldn't go; he spoke a little more rapidly, as we all do, sometimes, I suppose, and then he dug up a piece of alfalfa root which measured $1\frac{1}{2}$ inches one way and $\frac{3}{4}$-inch another, and 13 feet deep. This shows simply what may be expected of it.

A Member: What about a nurse crop?

MR. PEACHEY: I didn't say anything about that, but I suppose it is all right. I have no experience with it. If I were going to sow it that way, there is only one crop that I would sow with it, and that is barley. It makes a rapid growth in stalk, and has, perhaps, fewer root than any other plant. You take oats; that has too much heavy matter in it; if I were going to use a nurse crop I would take nothing but barley. My reason for not using a nurse crop it that is becomes a weed in many sections of your farm. Your potato patch may be the best place for it, but there it is full of weeds. I would rather fit the ground to sow it alone. I know many people advocate a nurse crop, but many others find it better to grow it alone.

A Member: How about manure made from alfalfa hay; would that help inoculate the ground?

MR. PEACHEY: I have not tried that, but expect to do so this year. I have eight acres that I have manured with manure made from alfalfa hay, and I hope it will innoculate the ground.

SECRETARY MARTIN: Mr. Chairman; I think it would be well to devote ten minutes of our time, before the next period begins to gaining a little more information about alfalfa. We have no record thus far of the extent to which this plant is grown in Pennsylvania, and I don't know how we could devote a few minutes of our time more profitably than that of learning how many of our county chairmen and Institute people are growing alfalfa. I believe the best plan will be to call the roll of the counties, and have you respond as your counties are called.

In answer to this roll call, it was found that in nearly every county alfalfa was being grown, in some of them with varying success, but for the most part successfully. The roll-call shows as follows:

Answering in the affirmative were, Adams, Allegheny, Bedford, Blair, Bradford, Bucks, Butler, Cambria, Centre, Chester, Clarion, Clearfield, Clinton, Columbia, Crawford, Cumberland, Dauphin, Dela-

ware, Erie, Franklin, Fulton, Greene, Huntingdon, Jefferson, Juniata, Lackawanna, Lancaster, Lawrence, Lebanon, Lehigh, Luzerne, Lycoming, McKean, Mercer, Mifflin, Montgomery, Montour, Northampton, Northumberland, Philadelphia, Perry, Potter, Schuylkill, Somerset, Sullivan, Tioga, Union, Venango, Warren, Westmoreland, Wyoming, and York.

The representatives from several of the counties not included in the above list were absent when this roll was called.

The CHAIRMAN: We will now pass on to the next subject, which is the "Care of Milk," by Dr. Conard, of Westgrove, whom I have the pleasure of introducing to you.

Dr. Conard spoke as follows:

CARE OF MILK.

By DR. M. E. CONARD, Westgrove, Pa.

Milk is the best, most nutritious, and most easily digested food that has ever been entrusted to our care. It is the food that is provided for the new-born babe, when its delicate little digestive organs for the first time take on the responsibility of nourishing, sustaining, and developing a new being. Its chemical constituents and cellular arrangement is such that almost immediately upon entering the stomach, portions of it, undergoing little or no processes of digestion, find their way into the blood and start the building-up process, as no other food does.

Nature has also provided a means of conveying it into the little stomach in its pure, fresh, warm and uncontaminated condition, the ideal of wholesomeness. This is ideal milk hygiene that insures purity and health. Does the implication of the word "pure milk" as so often seen commercially used on signs and wagons, give us assurance that we are being protected by any degree of "Milk Hygiene," comparable to Nature's plan in the feeding of our babies? No; the word "pure" has quite a different meaning.

It is generally used to convince the customer that an effort has been made by some one to prevent the introduction of, or to remove by strainer or other mechanical device, such material as may injure its keeping and market value. There is nothing said about its digestibility and nutritive value. The result of said effort is measured by a delusive measure, the length of time it will keep sweet and saleable. Now, if milk could be collected in such a way as to keep it perfectly clean and free of germs, it would not turn sour at all, but that is practically impossible, but the better care we bestow upon its handling, the longer it will keep sweet and wholesome. Milk to be of the best, must be kept clean from the start, but if once defiled, can never be corrected. If this fact was generally better known, and believed and practised, the quality and safety of our

milk supply would be much improved, without the aid of the many customs so common in the commercial handling of milk, which are paid for by the producer. I refer to pasteurization.

I do not deny that pasteurization has its place in the handling of milk, but I do claim to know that it is a good method badly abused at the present time.

As we all well know, pasteurization has for its object the destruction of all harmful germs, and that it has been learned that a temperature of 150 deg. F. for thirty minutes will destroy such germs, and yet has but little effect on the chemical character of the milk. It has also been learned that 165 deg. F. for thirty seconds will have the same germicidal effect. Now, the application of this method for commercial purposes has certain disadvantages or drawbacks.

First. That the process of holding the milk at 155 deg. for thirty minutes is so slow a process as to increase the cost materially, so the latter-named plan of momentary heating to 165 deg. has met with the greatest favor, and many machines have been built and are in daily use that are claimed to be so arranged as to permit of a continuous flow of milk passing through them, making the process much more rapid and short, and consequently less expensive. This seems to be a step in the right direction.

But the disadvantages are that it is difficult to keep the flow of milk so regulated as to remain at the required 165 deg. F. for thirty seconds, and if it reaches a higher temperature there is imparted to the milk a cooked taste, which is objected to, and renders it not quite so digestible, and, also, this high degree of heat breaks up the fat globules, and more thoroughly emulsifies the cream, so that it never comes to the top quite so well as before heating, and the cream line does not show so distinctly on the bottle. This the customer objects to, and the dealer tries to avoid. He is very much tempted to keep the temperature below 165 deg., so as to preserve the cream line on the bottle, and much of it passes through without reaching the temperature.

It is true that the germs known as Lactic Acid Germs, that cause souring and curdling, are much easier destroyed than most disease germs, and even if the temperature does not exceed 150 deg. F., the souring germs are destroyed, and for commercial purposes it is very much improved by the prolonging of its period of sweetness, and the cream line is not disturbed. This is commercial pasteurization. It has removed the easily destroyed germs of souring, which are harmless, and probably not injured in any way the germs of disease that are left in the milk to grow and multiply, unobserved by the presence of the acid-forming bacteria, who by their presence do to a very considerable degree prevent the growth of other forms of bacterial growth.

I am not condemning a thorough pasteurization of such milk as has not been gathered under sanitary conditions, but is loaded with disease germs of dangerous kinds. But I do claim that commercial pasteurization as largely carried on is a farce in the eye of science, and a menace to the consumer who buys it in the belief that he is protected against the very element it is most likely to contain, the unrestricted growth of disease of harmful germs. And to the producer it is a daily expense; for the dealer is professing to do at an enormous expense, the very thing that should have been done at

the dairy by a better knowledge of dairy sanitation, and better methods in caring for the product, thus producing a better and safer milk, for which he should receive additional pay.

MR. COWAN: You would not suggest that the farmer use this plan?

DR. CONRAD: Exactly what I don't do. I would suggest that he keep the dirt out of the milk. This milk I have drank when it was thirty days old, and with the exception of a little cream on the top, you would not know it was over a day or two old.

A Member: Is certified milk free from germs?

DR. CONARD: No; I don't think so; the germs are there, but they are dead.

A Member: Any danger in dead germs?

DR. CONARD: No; but the fact that the milk is shipped forty or fifty miles to the city, and then run through the machine again, or possibly even the third time, will render it indigestible.

MR. HULL: How low can you prevent the growth of the germs?

DR. CONARD: About 50 deg.

MR. HULL: If you can produce cleanliness by cooling the milk, you would not advise boiling it?

DR. CONARD: No; first keep it clean, and then keep it cool, and stop the growth of the germs—about 50 to 55 deg. will do it. Spring water runs about 52 deg., and if you can keep a stream of spring water running over that can, and keep it cool, I believe you can kill the germs better than in any other way, and make it safer than any other process. The process of cooling is one that requires a great deal of care. The milk should be turned out into the coolers without any exposure to the air, and then put into a cooling temperature. I am afraid that the cooling temperature will be over-estimated. I know in a great many cases people will set a can in a watering trough with about eight or ten inches of water and a can three or four feet high. Now, heat rises, and the upper part of that can will be warm, and allow the germs to multiply. The cooling medium should be cool enough to kill the germs, and of sufficient quantity to cover the can all over.

MR. HULL: Won't that take too long?

DR. CONARD: In the ordinary shipping can it will take half an hour, if set into a running stream of the required coolness have a little room, cool, and disconnected from the barn, cemented on the top and bottom, and then hang your cooler up in such a position that your can turn a spray of water all over it, and cool it thoroughly and evenly.

MR. HULL: Now, Doctor, we can cool it in thirty seconds, and keep it three days.

DR. CONARD: All right; if you can do that you are doing very good work.

MR. HULL: Now, is there not some other method? I have heard you advocate whitewash, but we do not like it; is there not some candle, or something that will destroy those germs?

DR. CONARD: The gas-sulphur candle, with everything closed, but that is troublesome.

MR. HULL: You would have to put the whitewash on every two years or so?

DR. CONARD: Twice a year, but the ceiling should not be too smooth. I would not use smooth boards on the inside of the barn; get ordinary sawed boards, and whitewash them with the spray pump. It will not look very well the first time, but it wll do very well.

A Member: How abont putting carbolic acid in while whitewashing?

DR. CONARD: You will probably hear from your milkman if you do; it leaves an odor in the milk.

The CHAIRMAN: Secretary Martin wishes to appoint a committee at this time.

SECRETARY MARTIN: Mr. Chairman, every year brings to our organization its pleasant memories, and also its sad ones. During this season there has been called from our midst, our good brother, Mr. McHenry, of Indiana county, and a number of other members of this organizaton are detained at home on account of sickness or bereavement. At this time it is usual to appoint a Resolntion Committee to take note of these things, as well as any other matters that may come up for their consideration. Therefore we will appoint on this committee the following members: Mr. Blyholder, Mr. Clark, Mr. Gooderham, Mr. Cowan, Dr. Conard, Mr. Lighty, and Mr. Dorsett.

This committee will take charge of the resolutions you may have to offer, and such others as are customary at this time.

I am pleased, my friends, to see the interest you have thus far taken in the discussion. This afternoon's program, you will see, is given over to poultry, and tonight sheep husbandry will receive attention, all of which will be handled by successful growers from our own State, as well as by that great expert on sheep husbandry, Joseph E. Wing. I am pleased to see that Mr. Wing has just come in a few minutes ago. I am sorry that he was not here in time to hear the discussion on alfalfa. Mr. Wing will come up front and favor us with a few words by way of saying "how do you do."

MR. WING: I would certainly get up to talk about alfalfa at any time. I wish I had come in to hear the alfalfa discussion. Just before I left home my brother and I rented a sixty acre field to plant it with alfalfa. This land has been producing twenty bushels of corn to the acre, or even less than that. It is now seeded with alfalfa, and we expect to make a little money out of it. When we went to rent the field, we asked the owner, what will you take for it; will you take a hundred dollars? Two hundred—four hundred—six hundred. He said the price of that land is $1,000, strictly in

cash, and we paid that thousand dollars. We will get this year, I suppose, about five tons to the acre, so that we can well afford to pay that thousand dollars for the field. In fact, I rather feel that I am cheating my neighbor out of some of his rent.

Alfalfa is the coming grain, and I am pleased to see that Pennsylvania is falling into line. It is not planted in such large quantities as clover, but the acreage planted is constantly growing, and it points the way to larger things. Why, the limestone soil was created for alfalfa. A land that is dry, and won't fill up with water in the winter, that is filled with carbonate of lime, and is fairly fertile, will grow alfalfa, and big alfalfa at that. It can't fail to grow alfalfa. I advise you men who think you can't grow alfalfa to do a few things; first, get your soil dry. Why, we laid eighteen or twenty miles of tile draining in some of our fields, and in this very field that I have just told you of, we have already laid several miles. The land must be made dry; then it must be made alkaline with lime; along the fields of Pennsylvania I saw many places that are full of sorrel. Now, that is a pretty sure indication of an acid soil; to turn an acid soil alkaline, there is nothing that will do it so well as lime, and I prefer the ground limestone, rather than the acid lime. Now, after you have made that soil sweet and dry, and then made it rich. And after that is done, inoculate you soil with soil from some alfalfa field or sweet clover patch, and then sow your seed in the spring or fall. I sow mine in the spring, and then when you fail—why, you simply cannot fail if you do these things.

Now I am going to tell you a story. Down in Virginia they have a river that they call the Rappahannock. It is a quiet and slow old river, but at one time it was not so. Commencing at Port Royal, the country along its banks was settled the same time that Philadelphia was, and at one time Port Royal came very near being the capital of the United States, but at present it has a population of two hundred inhabitants, and one hundred and seventy-five souls. The streets are full of nice green grass, and the cattle keep it cropped. Now, along the banks of that river were borne George Washington and Martha Washington. I visited their old home, and I tried to feel like Martha Washington when I sat in her chair, but I don't think I succeeded very well. Besides George Washington, President Madison —or was it Monroe? I am not sure—was born along the banks of this old river; it has been so long that I've had any acquaintance with these gentlemen that I've forgotten. Well, anyhow, I was on that river, the other day, and was surprised to find how the commerce of that noble river had shrunk. We would stop along our course, to take on a calf, or possibly two, but that was the exception. The folks who live along there are very fine people, very intelligent people, and I like them. Well, I went on down to Port Royal, and found a country rediscovered, since the English discovered it several hundred years ago. It was rediscovered by a man named Jack, from Los Angeles, California. He came East in 1905, and stirred around the country a bit, and then he discovered this old river. He had money; had got rich out in California, and when he came and discovered this old river, he took a fancy to it, and bought 1,700 acres of land on its banks. Most of this land had been abandoned as too poor to raise anything, but he set out to make an alfalfa plantation out of it. He knew nothing about the land here

in the East; had never lived in the East. So he went to Washington, and then to the alfalfa department of the United States government, and said to them: "I have some land down here on the Rappahannock, on which I would like to grow alfalfa; will it grow?" "Oh, certainly," they told him, "it will grow; how much land have you?" "Seventeen hundred acres," he told them, "and I want to plant it in alfalfa." They stood aghast. "Seventeen hundred acres! Why, man, you must be crazy." "Well," he said, "what about a thousand acres?" They regarded that as colossal, and told him he would throw the alfalfa industry in the East back forty years. Then he came down to six hundred—five hundred—four hundred acres. But still they insisted it was too much; he must get that soil ready before he could grow alfalfa. This was not California, where it grew without any preparation. "Well," he asked them, "what must I do?" "Well," they told him, "first, you must lime it. "How much lime would I need for four hundred acres?" he asked them. "Suppose you begin with a hundred and fifty acres," they told him. "All right," he said; "how much lime for 150 acres?" They told him 400 bushels for the 10 acres. He put it down in his note book. "Now, what next?" he asked. "Next you must give that land some phosphorous," they told him. "What is that?" he asked. "Something that is needed to enrich our Eastern soil," they told him. "How much of that?" he asked. "Four hundred pounds of bone meal to the acre," they told him. He put that down in his note book. "What next?" he wanted to know. "Well, then you must innoculate the soil." So he got the 400 bushels of lime, and the 400 bushels of bone meal to the acre, and he limed it, and he made the soil fertile, and he got some alfalfa soil and inoculated that land, and then he sowed his alfalfa seed—150 acres of it, and he got 150 acres of the most beautiful green alfalfa. Next year he sowed 160 acres more, and got 160 acres more of alfalfa. This year he put six hundred tons of lime on that soil; to grow alfalfa. He has 320 acres of fine alfalfa, and about 1,500 acres of the finest crimson clover, which he is growing to turn in and grow alfalfa on that land. From his 320 acres of alfalfa he will grow 60 tons to the acre, and it cost him $20 tons per acre. Now, it does not look reasonable or right for a man who has no need of money to come all the way from California and make money. I said to him "why are you doing this?" He said. "Isn't it worth while?" "But," I said, "I happen to know about your operations in California; haven't you got money enough?" He said, "Did anybody ever have enough? But it is not for money that I am doing this," he said; "I came down here and found these people so discouraged; they were scarcely making aliving, and they did not have the money to educate their children in the way they themselves had been educated; I liked them, and I thought to myself, why not buy some land here, and teach these people how to grow alfalfa, and give them a new start in life; now I have this alfalfa growing, and they come and look at it, and go home and try it themselves, and I have never done anything in my life that gives me as much pleasure as this does. It is putting new heart into these people, whom I like so well for their kindliness and intelligence. And any man who will make his soil dry, and make it sweet, and make it fertile can grow it."

The CHAIRMAN: We will now stand adjourned until 1.30 this afternoon.

Wednesday, May 26, 1909, 1.30 P. M.

Mr. Sexton in the chair.

The CHAIRMAN: The meeting will please come to order. Before we take up the program, Prof. Menges wishes to make an announcement.

PROF. MENGES: The Manufacturers' Association of the city extend an invitation to the Institute to visit the York Heat and Power plant tomorrow afternoon. This opportunity we would like every one to avail themselves of. We are, as you know, a manufacturing city, and we would like to show you where our power comes from now, and where we hope to get more of it in the future. The manufacturers in this town are very largely manufacturers of farming implements. There will be two cars on the square, which will leave at three o'clock tomorrow afternoon, for York Haven. That is about an hour's ride from here, so that you can easily go through the plant and get back here in time for supper at six o'clock.

Another thing; the Historical Museum above us will be opened at four o'clock for the inspection of any one interested. York is quite a prominent city, historically; we were at one time the capital of the United States; the Continental Congress met here once—

The CHAIRMAN: For how long were you the capital of the United States?

PROF. MENGES: Not very long, but longer than the rest of you fellows were.

Another thing: Mr. David Goodling, a member of the Agricultural Society will be very glad to accompany you to the Fair Grounds, and also to the York Manufacturing plant this afternoon. After the Institute is over this afternoon, he will be right in the corridor of the court house, and you will be welcome to take advantage of his courtesy.

SECRETARY MARTIN: I might say right here that our Institute will make an effort to adjourn tomorrow afternoon at three o'clock, so as to visit the power plant.

I might say that the hotel at which most of us are stopping, in order to give us better accommodation, has arranged to have breakfast for us at seven o'clock, dinner a little after eleven, and supper at five, so that we can all be served without any trouble.

PROF. MENGES: I might say that special cars will be brought to take you out to the Fair Grounds, or any cars will take you there free of charge, if you wear your badge.

The CHAIRMAN: We will now take up the program, and discuss one of the most important subjects, and also one of the most interesting to the farmer—the poultry interest. It gives me pleasure

to introduce the first speaker on the subject—Mr. H. W. Jackson, of Cambridge, Ohio, who will now tell us about "Poultry Keeping on the Farm."

Mr. Jackson spoke as follows:

POULTRY KEEPING ON THE FARM

By HOMER W. JACKSON, Cambridge, O.

The subject which has been assigned me for discussion today calls attention at the outset to the peculiar status of the poultry industry in our agriculture. We do not hear any serious discussion of horse-breeding on the farm, or wood-growing on the farm, or dairying on the farm as distinguished from production elsewhere, because no important effort is made to follow these industries anywhere save on the farm, or ranch. But while poultry keeping as a commercial industry reaches its highest practical development on the farm, it is so readily adapted to extensive conditions of space limitation, at least theoretically, that it is found more or less successfully established in all locations from backyards to ranches. This fact seems really to be something of a disadvantage to the development of the industry on the farm, because for a variety of reasons, it has resulted in developing methods and literature along lines that did not and could not meet the approval of farmers generally. As a result they have not had the interest in the industry which they would have had if the most approved methods had had a more practical development, and if the true status of poultry keeping had been clearly understood.

The general idea that poultry keeping can and should be more or less divorced from other farm work seems importunate. There will be in all probability a permanent and profitable place for exclusive poultry plant, but students of the industry are almost unanimous in the opinion that the most practical and profitable development will always be on farms and in combination with other lines of farming, just as has been the case with other branches of livestock. Generally the point seems sometimes to be overlooked that poultry is a branch of livestock farming. The current expression "livestock and poultry" is a misleading one, which we have reason to resent mildly. The same general principles guide the poultry keeper which obtain in any line of live-stock breeding. The same feed stuffs are used and in a larger or smaller degree the same results sought and secured. Many of the general advances in livestock methods reached their earliest acceptance and development in the poultry yard. It is not true therefore that the poultry industry is a live stock appendix. This point seems worth contending for, because I have the impression that much of the lack of appreciation of the industry on the average farm is due to the fact that its relation to other lines of livestock farming is not clearly recognized, nor is the magnitude of the industry appreciated.

Thanks to the enthusiastic favor of Secretary Wilson, it is now pretty generally known that the annual poultry income amounts to at least $600,000,000, but to most farmers I presume that the statement that this industry ranks third in income production among all branches of agriculture and stands far in advance of any other live stock industry is as surprising and questionable. This statement, which is justified by the U. S. D. A. statistics, is not given by way of boasting, but, rather, to call attention to the possibilities which lie in the future. Because, in spite of its present magnitude, poultry keeping is as yet practically an undeveloped industry. What has been accomplished has been in the face of mistakes, discouragement and ridicule, and without any appreciation of the relation which the industry nominally sustains to agriculture. When farmers generally take poultry keeping out of the fad and pin money class and recognize it as an important part of the farm's livestock equipment, the annual production will reach sensational figures.

I am sure that at this point the question occurs to many, Why, if this is true are there so few successful poultry plants to give emphasis to these clauses? The statement carried in the question, that there are few successful plants is not exactly true. That $600,000,000 income is in itself general proof of the existence of a multitude of these. Poultry is found on nearly all the farms of the country having a more general distribution than any other industry. The farm flock is, however, relatively quite small and hence of little value for illustration except in the aggregate. While it is true that the number of successful poultry plants of large size is yet quite small, there is not only not anything impossible about their successful development but, as the conditions governing their management come to be better understood, there is reason to expect that their number will rapidly increase. It is quite probable, however, that the great bulk of the poultry business will continue to be represented by small holdings rather than by large exclusive plants.

I do not undertake to recommend poultry keeping indiscriminately for all farms and all farmers. Many things must enter into the discussion as to what kinds of farming shall be undertaken, personal preference perhaps being more important than any other. But in comparison with other lines of farming the poultry industry has important claims on your attention. Small investment, utilization of waste land and cheap feed stuffs, light work adapting it to persons of limited strength, quick and constant returns, universal market, high market value of products, light weight of products and ease of transportation, economy of farm fertility, these and many other points favor the industry and go to explain how it has reached its present development in the face of little appreciation, and why we have so large faith in its continued development in the future. I shall not take the time to discuss these points in detail, their truth is already fairly conceded, and their importance understood in some measure. I wish to devote the rest of the time allowed me to a discussion of the methods most likely to be made use of in the development of the industry.

These methods must at the start be adapted to the convenience and necessities of those who want to follow the poultry keeping on general lines of livestock farming, making it simply a branch of the farm work. What is wanted here is a method which, while provid-

ing for the development of this branch of the work to proportions large enough to make it important commercially will still be simple in theory, practical in application; that will utilize to the fullest extent cheap and waste feed stuffs and will make no extreme demands on the time and strength of the farmer and will permit the care of the flock to be turned over at least in emergencies to wife, children or hired man. There are many methods adapted to the varied conditions under which poultry is kept, but I know of no way which so exactly meets the conditions as above stated, as what is known as the colony method. This is recommended because it seems wise to adopt on the farm a method which, if carried out with ordinary care and attention to details, will result in the largest returns on capital and labor, rather than to adopt one which while it may show larger returns will be complicated and exacting and demand much more labor.

It is conceded that the colony method of poultry keeping, as applied to laying hens, is not likely to result in maximum egg production. But after all it has never been proved that maximum production means maximum profit. Ordinary farm production is very low, because ordinary care spells neglect and it is possible to make important advances in production by the adoption of methods of care and feeding easily in the reach of any farmer. But when it comes to the extraordinary measures on which record breaking results depend it is not at all certain that much is gained. Certainly such methods are not to be recommended in general farm practice.

It would seem that the key to successful farm poultry keeping is the farm range. The man who has his flocks on a range has more than solved his problems, losses and labors, in addition to reducing his feed bill. And the location of poultry in flocks of suitable size on open range, in detached houses far enough apart to prevent much mixing of the flocks but with no house far distance from the dwelling or barn as a common center, is substantially the colony method. Exercise, green feed and meal food and variety in feeding, which are constant sources of expense and anxiety to the intensive poultryman, are secured without effort during most of the year, and the otherwise waste feed supplies of the range help materially in reducing cost. Probably it is a mistake to attempt to make the range support the flock entirely, as that will generally result in limiting it to so small a number as to make the returns insignificant. The true idea in most cases would be to make the flocks large enough to maintain a production that would enable the farmer to make up commercially profitable shipments of stuff still fresh and in condition to sell on the best markets.

As applied to egg productions, which is much the most important and most profitable branch of the industry in general practice, this might mean keeping several hundred hens, which is easily practicable on most farms. The houses need be only of the cheapest and simplest construction, and should be large enough to accommodate 50 to 100 head or even more. Some successful farmers keep their hens in flocks of 200 and consider that number entirely satisfactory. This seems extreme but at least it shows the trend of development. The houses for several hundred hens, if properly distributed, may be far enough apart to prevent serious mixing of the flocks and yet all be within easy reach of the dwelling. Whenever possible they

should be so arranged as to permit the hens to enter and leave without requiring the attendant to open and close doors. Natural or artificial watering places will save a great deal of time.

The feeding method which seems best adapted to colony poultry farms is the dry mash, semi-hopper plan. By this is meant keeping before the hens constantly a dry mixture of ground grains in boxes or hoppers. To this is added in daily feeds as much grain and meat scrap as the condition of the hens seems to demand.

Opinions differ pretty widely as to the proper constituents of the dry mash and the poultryman will find it necessary continually to modify his ideas of what should go into the mash to accommodate himself to the notions of the hens. In a general way it is found that a very fine mixture will not be popular and often better results can be secured by using a simple mash of bran and shorts, or what is known locally as run-of-mill, with about 10 per cent. each of oil meal and meat scrap added. Corn meal, gluten and other fine feed stuffs may be added, but usually their addition will promptly curtail the consumption, and in such cases is not to be recommended. The simplest way to feed this is to put it in a box large enough to hold 2 to 4 weeks' supply and deep enough so that the hens cannot scratch it out and waste it. Hoppers as generally constituted, clog or permit waste.

This grain feeding will vary with the season and the breed. Corn may well be taken as to basis of the grain ration and fed as liberally as possible without injury to the hens, as it is undoubtedly the cheapest, and within proper limits, the best grain for feeding hens. It cannot be used alone however, with good results, nor should it be fed blindly at any time. Most of the year, however, a single daily feed of corn limited to an average less than two ounces per hen will be safe. If other grains are available and not too expensive it is well to use them in place of corn part of the time.

So far nothing has been said about breeds or hatching and raising the young stock, each of which demands fuller discussion than can be given now. Briefly it should be the farmer's time to stop with what he has, use pure fed meals and at the same time start a small pure bred flock with the purpose of replacing the grades with pure feeds as rapidly as possible. The particular need to be kept may well be left to personal preference. Artificial hatching and brooding methods are much more satisfactory than the natural way if successfully accomplished. Success however is an individual victory and for the encouragement of those who are not successful or do not want to pay the price of victory, I want to say that for the flocks demanded on most farms, chicks can be hatched and raised by natural means about as cheaply as with artificial appliances, if only the proper facilities are provided. And then facilities need cost only a fraction of what a complete incubator and brooder outfit would cost.

In feeding young chicks, the methods must be different from the feeding of grown stock. Here everything must lend to the health of the baby chicks and their rapid and continuous growth and development. To that end they are fed chick feed and convenient farm grains finely cracked, until they reach five to eight weeks. Then they should be put on a self-feeding schedule and given all they will eat. The usual practice is to supply feed boxes containing dry mash,

cracked corn and meat scraps and add one feed a day or wheat or other grain and one of wet mash. These daily feeds can be omitted of course, but it is very doubtful if it is wise to dispense with the wet mash until chicks are full grown.

In conclusion, I want to mention the most important objection likely to be urged against keeping flocks on open range, which is the damage that they may do to farm crops. Now hens do not damage crops unless they are hungry, and the way to prevent crop damage is to give more feed. If the hens can get at the poultry house what they might damage in the field, they will let the fields alone. For several years we have had crops raised on the shares on our farm. The man who does the work is given to understand that the hens have the right of way and will in no case be confined. But he is also told that if they damage his crop we will pay the damage in full and he can set his own price. In many years experience he has never asked for a cent of damage. There has been usually a little damage done right around the houses, but the man has always contended that the hens have saved him more by destroying grubs and injurious insects than they have destroyed in the crops. We have accomplished this simply by seeing to it that the hens found at their houses plenty of the grain sowed or ripening in the field. Such feeding is heavier than really necessary on the range, but it only needs to be continued a short time till the sprouting grain is out of danger or the ripening crops harvested and in the aggregate the extra cost is slight. The garden and house yard must of course be fenced, but that is the only special precaution that needs to be taken.

A Member: We hear so much about the $600,000,000 income from hens. Now, would the speaker be in a position to tell us how the income from hens compares with the income from grains, fruits, etc.? I would like the net profit, not the gross amount.

MR. JACKSON: I don't know any way to figure out the net profit, but I can say that so far as concerns any other line of stock farming, in proportion to the amount of food assimilated, the net results are higher. I know of no way of arriving at a direct answer to the question.

MR. BLYHOLDER: At what age would you recommend feeding the young chickens first?

MR. JACKSON: Well, that depends on conditons, and runs all the way from immediately after they are hatched up to five or six days. There is no best time, except to feed them when they are hungry. The ordinary run of chickens do not want to be fed immediately after they are hatched, nor for some little time afterwards.

MR. BRODHEAD: The speaker stated he made boxes for his mash. Are they high enough for the chickens to get their feet in them?

MR. JACKSON: Yes; very little dirt goes into them. Of course, the straw has occasionally to be removed.

MR. PEACHEY: I happen to know something of that Lone Star hen, and I would suggest that Mr. Jackson tell us something more about her.

MR. JACKSON: Well, this hen happened to be a backyard hen, and she was bought by two maiden ladies to eat, but at the critical time, their hearts failed them, and they tied her to a string, which they fastened to a brick, and turned her into their back yard, and soon got so interested in her laying that they forgot to kill her. I often wonder that they had the heart to eat her eggs, they were so much attached to her.

MR. PEACHEY: What was her record?

MR. JACKSON: 305 eggs in seventeen months.

MR. HOOVER: What breed do you consider best for laying, and for a good, full sized chicken?

MR. JACKSON: Well, that is rather a difficult question, for there are half a dozen breeds that would come up to those requirements. I don't want to discriminate, but there are the Rhode Island Reds, Plymouth Rocks, Wyandottes—all good practical farm breeds.

MR. HOOVER: I have tried the one breed, the Plymouth Rocks, and they do very well.

MR. HUTCHISON: What makes them pull out their feathers?

MR. JACKSON: Usually the result of idleness and close confinement. I have never had any trouble in stopping it by turning the hens out on the range.

MR. HUTCHISON: A man in our community who has a bunch of good laying hens, which have the run of the range, has at the same time the worst-looking lot of chickens I have ever seen. They pull out their feathers until they look like ghosts.

The CHAIRMAN: What is the best remedy for gapes in young chickens?

MR. JACKSON: Curing, or prevention? The best way is to prevent them; if they get them, the best way I know of is to use the horse hair. The best way to prevent them, is to change the location of the chicken coops. There are certain places that seem to breed them. There are places on my farm where I cannot risk chickens two years in succession. It is a little inconvenient to keep changing, but it is the only prevention that I know. The use of lime or kerosene emulsions are advocated, but if you are troubled in that way I would move the chickens from time to time.

The CHAIRMAN: If there are no further questions, we wil pass on to the next topic—"Poultry Light for those who sit in Darkness," by Mr. Charles T. Cornman, Carlisle, Pa. It gives me pleasure to introduce to you Mr. Cornman.

Mr. Cornman's address is as follows:

POULTRY LIGHT FOR THOSE WHO SIT IN DARKNESS

By CHARLES T. CORNMAN, Carlisle, Pa.

Mr. Chairman and Friends: I call you friends for the fact of your assembling together at this institute shows your great interest in all those things that pertain to the betterment of Agriculture, and if

you are interested, then indeed and in truth you are my friends and the friend of every wide awake and up-to-date citizen of this great State. It is not my custom to speak from manuscript, but when I appreciated the fact that my audience was made up of the bright lights in agriculture of this and other states, I thought best to do so. It has been my pleasure to do considerable educational work at institutions of learning and institutes of other states. I regret that this is my initial bow to an audience in my own state. I can but credit the reason to the fact that a prophet hath but little credit in his own country.

It was my great pleasure a short time ago to view that grandest of all scienic productions, "The Creation." So great and grand and inspiring that one was lost midst the darkness and the stillness and the mystery until forgetting ones self the century seemed to roll back, back, back to the very beginning of things temporal.

Out of the midst of the great darkness and stillness came the sound of a voice, musical, deep, one sweetly tuned in the harmony of oratory. "In the beginning God created the Heavens and the earth, and the earth was without form and void, and darkness was upon the face of the great deep and the spirit of God moved upon the waters and God said let there be light."

Across the darkness flashed a silvered ribbon quickly followed by golden clouds. In a moment, in the twinkling of an eye the whole world was bathed in a golden flood, and there was light.

This is an age when all mankind is crying out for the light, and my mission here to you is to bring to you in my feeble way what light I can along those lines that lead to better poultry and more of it.

Poultry culture is but the silver ribbon across the darkened horizon, and I hope to see the day when the clouds will give way to a full burst of light and this country will awaken out of sleep and appreciate in its fullest sense what better poultry means to every man, woman and child in this greatest, richest and grandest of all countries.

Congressman Dawson, of Iowa pays this deserved tribute to the American hen. "Poets may sing of the glory of the eagle and artists may paint the beauties of birds of plumage, but the modest American hen is entitled to a tribute for her industry, her usefulness and her productivity."

The American hen can produce wealth equal to the capital stock of all the banks of the New York Clearing House in three months and have a week to spare. In less than sixty days she can equal the total production of all the gold mines of the United States. The United States proudly boasts of its pig iron, by far the greatest of any country in the world, and yet the American hen produces as much in six months as the iron mines of the country produce in a year. In one year and ten months she could pay off the interest bearing debt of the United States.

And yet in the eyes of the great majority, the American hen is here only because she is here. In considering one of the great problems of the day, the necessary food supply of this and all other countries, the hen has always been an important factor. What she really contributes toward the support of the eighty millions of people in our own country it is difficult to estimate. The value of poultry products is estimated at five hundred millions eight hundred thousand dollars,

calculated as follows: The farms in 1905 eggs based on information at hand two hundred forty millions nine hundred thousand dollars. Poultry based in a like manner three hundred fourteen millions four hundred thousand dollars, a total of five hundred, fifty-five millions three hundred thousand dollars. In villages the value of poultry and eggs is estimated at forty-five millions five hundred thousand dollars, making a total as above. In presenting the case to prove the above statement I would say if the summary of the above is accepted, it appears that eggs to the value of two hundred sixty-five million dollars was produced and sold or eaten in 1905. You must remember that this calculation is the home value of the product and not the cost of the consumer. If the value to the consumer was considered it would add at least 100,000,000 to the value of the product. This would bring the total value of poultry products of all kinds as sold to the consumer to the enormous sum of $600,800,000.

Through the records kept by the commission houses, there can be traced nearly two thousand million dozen eggs gathered and sold during 1905. This would be considered an enormous number of eggs were it not that it provides less than one egg per day for the inhabitants of this country.

In dividing the sections of the country we credit the dozens of eggs sold to each locality. In this estimate it is surprising to notice that Missouri is in the lead with 85,000,000 dozen eggs, Ohio which is not usually credited with equal importance in poultry matters to other states has a credit of 81,000,000 dozens of eggs produced. The order of production of a few of the largest producers would be as follows: Iowa first, Ohio second, Illinois third, Missouri fourth, Kansas, fifth. The North Atlantic States, including New York, New Jersey and Pennsylvania, do not stand near so well in the egg production as do the North Central States. Out of the billion and a quarter dozens eggs purchased during the year in this country, Ohio, Indiana, Illinois, Michigan, Iowa, Missouri, the Dakotas, Nebraska and Kansas produced 716,000,000 dozens, considerably more than one-half the entire egg production of the country. American people are the heaviest consumers of eggs in the world. Allowing a population of 80,000,000, the product of eggs for 1905 would provide about $3 worth of eggs per capita to the entire nation. You will probably be astonished to learn that England imports over $40,000,000 worth of eggs and poultry into her immediate country. Of these the greatest amount comes from countries as follows: Russia sends $15,000,000 worth, Denmark nearly $1,000,000 worth, Hungary, Italy and France follow according to the mention of their names. Only about $5,000,000 worth of poultry is imported. This comes from Russia, Belgium, France, the United States standing fourth in line. Russia sends about $1,000,000 worth of dressed poultry into England. Ireland produces $20,000,000 worth of dressed poultry that was sold for market. The total value of poultry and eggs consumed in the United Kingdom was about $1,000,000,000 of which eleven-twentieths is produced in the empire. the balance sent from other countries.

A lesson of considerable interest may be drawn from this information. Russia the coldest, and considered to be the least advanced in livestock matters sends more poultry and eggs into England and Germany than all the balance of the countries. We have always claimed that the United States was the largest producer of all kinds

of poultry products in the world. If Russia can supply her own demands for eggs and send supplies amounting to nearly $15,000,000 into England and a greater amount than this into other countries, what have we to say who claim to be the poultry exporters of the world when we face the fact that we are not exporters but importers of eggs, and that we only send to the United Kingdom $1,000,000 worth of poultry products in an entire year. Another matter of importance in the value of the products. In the eggs imported into England, those from Denmark stand first as to quality and price, Canada second, France third, Belgium fourth, Germany fifth, France and Belgium very close together. It is a pleasure to learn that with all deference to France and Belgium, Canada stands second and must send their eggs four thousand miles across the ocean to meet in competition with those from near by countries that can reach London in a few short hours. Let the American farmer consider this proposition thoroughly and take hold of the growing of poultry in a manner that will improve both quality and quantity so as to bring the quality up in advance of all other nations and at the same time have quantity to supply the world.

So much for generalisms; but how about our own State. The poultry products of Pennsylvania amount to sixteen million three hundred nineteen thousand nine hundred sixty-eight dollars yearly, quite a tidy sum, but far from what it should be and what it can be. When we consider the fact that the State has invested in poultry stock three hundred dollars, in buildings two thousand dollars, in equipment five hundred dollars, and pay for maintenance and salaries twenty-two hundred fifty dollars, making a total of five thousand and fifty dollars, we note the fact that this State receives thirty-two hundred thirty-one dollars and sixty-one cents for every single dollar expended and I have included the permanent fixtures. The State pays for horticulture one dollar for every nine hundred fifty-six dollars eighty-one cents received, and for dairy one dollar for three hundred thirty-three dollars fifty nine cents received. There is a striking lesson in the fact that vastly more people are engaged in poultry culture than are in dairying and horticulture, and yet they are always given the precedent. As a general thing agriculture in most of the states (and I do not except Pennsylvania) is compelled to take but the crumbs that fall from the rich man's table, and poultry culture gets but few of the crumbs. The object lesson given the country during the business depression of the past several years, when, had it not been for agriculture with its millions of reserve, the load would have been almost beyond the power of this country to bear, should bear fruit an hundred-fold and place agriculture where it belongs, at the very head of nation and state.

The Keystone State consumes five times as many eggs as she produces. Of course Pennsylvania does export something toward the East, but a mere trifle compared with what she imports from the West. There is a single wholesale grocer in the city of Pittsburg who handles an average daily of three hundred cases of eggs of thirty dozen each. He pays out for eggs about half a million dollars each year. How many Pennsylvania farmers participate in this handsome sum of money. Not one. Every egg that this man handles comes from Indiana, where careful buyers gather them from the farmers. He says "the Western Pennsylvania farmers do not pro-

duce enough eggs, especially in the winter, for me to bother with. Of course I would rather buy home eggs, but I must buy from people who have eggs to sell." This man pays good prices. He handles fresh eggs only. He has no use for cold storage eggs. He would pay higher prices if he could get a constant supply of nearby fresh eggs. From September first to March first, a period of six months, the wholesale Pittsburg price will average thirty cents per dozen for strictly first-class eggs. It has been demonstrated again and again that the man who can produce eggs at all in this district in these six months does so at a food cost of not over ten cents per dozen. In what other line of animal industry can one find a larger margin to pay for the labor and interest on the cost of investment. Eastern Pennsylvania demands even a better quality of poultry and eggs at still higher prices. The better class residents of Philadelphia and New York are each year becoming more fastiduous as to the quality of the poultry products they consume and less careful as to the prices they pay, provided the quality is above reproach. Not only in the two cities named, but in a dozen smaller cities are people who contract for their eggs six months at thirty cents per dozen and six months at forty-five cents, just so they get eggs that are strictly first-class. In New York last winter I say eggs put up in cartons and marked "strictly high class fresh eggs for invalids; price $1.00 per dozen," and those eggs come from my home town of Carlisle, Pa., and if I were to tell you that these parties shipping them does not produce an egg, but buys them from the farmers you would evidently be surprised, but such is a fact. They buy all the fresh eggs possible to get, and never place a dozen on the market for less than ten cents above the market price. How do they do it? Every egg is candled, washed, selected, of uniform size and color, packed in neat carton and strictly fresh, and are shipped to Hotel Waldorf-Astoria, Delmonicos, Park and Telford, Woman's Exchange and similar places that will pay any price for the very best, for the reason that they get the very best prices for such eggs. Why does the average farmer sit with his eyes blinded and permit parties at second and third hand to make the money that should come direct to him.

Again Pennsylvania is furnishing a constantly increasing demand for more table poultry of first quality. One has only to loiter around the commission houses to learn that most of the dressed poultry consigned will not rank above third-class, and that first-class poultry sell more readily and for twice as much money as poultry that grades only third-class.

To illustrate how determined people of means are to have poultry and eggs of the very best quality, I could name a number in the different states that have erected and stocked valuable poultry plants only for production of what first class poultry and eggs that want for their own consumption. There is a plant building now at Allentown by the Cement King of America that will be stocked with White Leghorns for eggs, with White Indian Game and White Orpingtons for broilers, and White Pekin ducks and White Holland turkeys, and all he asks of his manager is that his home be supplied with strictly first class eggs and poultry. Do you think this man would bother if some wide-awake farmer could produce just what he wants? Decidedly no; and he would pay any price for them.

A woman of my acquaintance has been supplying fresh eggs and dressed chickens to some of the best families of a nearby town. She assures me that during six months of each year she never sells an egg for less than two cents, and during the remaining six months for never less than three and one-half cents. Her uniform price for dressed chickens is 25 cents per pound, and she assures me that there are families that have not failed her a week in three years to take from her at least two dozens of eggs and one chicken. She has constantly a waiting list of families anxious to get their supplies from her. She goes to town every Tuesday and Friday of the year and she so manages her flock that each market sees her ready to supply not less than twelve dozen of eggs, not less than ten dressed chickens. Her poultry flocks bring her an income of fully fifteen hundred dollars per year. How did this woman get her trade and how did she hold it? Simply by learning how to produce a first-class article and by never marketing an egg or chicken that she cannot guarantee as up to her high standard. Could she hold her customers year after year if she supplied them with eggs such as you see in the average farmer's basket, some white, some brown, some large, some small, some rough, some smooth, some clean and some dirty? Not at all. You could tell at a glance that she had a mixed flock of mongrels and that a chicken was a chicken and an egg an egg on that farm. Could she hold her trade on dressed chickens if she marketed them in bad condition, some white, some yellow, some fat, some lean, some neat and some mussy? She studies the wants of her customers and she knows what she wants and does her best to produce it. The great trouble with the average farmer he does not study the demand of the market. They will not take the trouble to learn the difference between a first-class article properly packed and a third-class article poorly packed, and then the cry goes up of the poor prices realized. The greatest obstacles that now stand in the way of profit from poultry on farms in this State are mixed flocks, poor houses, bad feeding and careless marketing.

Universities and colleges are doing much to dispel the clouds that hide the light and cloud the vision of the farmer and villager, but it is up to the states to take the matter well in hand and solve for them the problems. I am glad to note that this State has taken the matter under consideration, and for the past few years poultry culture has a place on the Farmers' Institute programs of the State, and is being recognized as a very important branch of agriculture. When one considers what it means to the State, it is difficult to understand why it has been so thoroughly neglected. The average egg production of the mongrel hen is eighty-two eggs per hen per year. The average weight of the mongrel chicken is three and one-half pounds. Now what is the problem for the State to solve? The farmer must be educated to bring the average of his flock up to two hundred eggs per hen per year and the weight of his fowls to five and one-half pounds each. I want to show that as a business proposition for the State it is one of the greatest ever presented of them. If you can increase the egg production eight eggs per hen and the meat production one pound per chicken you have added to the wealth of the State more than a million and one-half dollars. And I want to say that it can be done in two years time. This is an intensely practical age, and one must go at the farmer in a practical way. What does the

average farmer care to know the amount of ash, crude protein, carbohydrates and fat in corn or wheat or oats, and what the nutritive ratio is. He don't care a rap to know the amount of gas generated during incubation or the amount of moisture absorbed by the chick. What does he care about the composition of the egg or chicken. What he wants to know are the plain facts as to how best to get results. In other words the farmers of Pennsylvania must have a primer on Poultry Culture to be compiled in parts and made a reading course in which every phase of plain practical poultry culture is taken up and discussed and so arranged that the farmer can ask questions regarding conditions that exist in his vicinity with a view of their proper solution, and it is up to the Agricultural Department to aid him to solve it. In ten years the poultry products of this State can be brought up to the fifty million dollar mark. This is an age of great movements, and let the State of Pennsylvania make this one of its great movements.

I canot close without a short comment on one of the industries in which Pennsylvania is so largely interested, namely, the Pekin Duck industry, and one of which she can be greatly proud. The duck season closed about September first, and the raisers enjoyed a very good one.

Green ducks did not go below sixteen cents per pound and the minimum of price covers a good margin of profit. Green ducks come into the market late in April, when they command a price of from thirty to forty-five cents per pound. By green ducks is meant ducklings averaging about ten weeks old and weighing from four and one half to six pounds each.

Long Island, N. Y., now markets more than 350,000 green ducks each season. Neck to neck with Long Island comes Pennsylvania. In computing the numbers raised at the seven largest ranches, I find them producing 325,000. Taking the smaller plants into consideration throughout the State, Pennsylvania now stands first.

There are several ranches in New Jersey and several in Massachusetts. A number have been started in more western territory, some of which have been very successful.

Four have lately sprung up in Michigan and Ohio, two of which are near Detroit.

The West for some reason has failed to develop this industry and we find no ranches near Chicago, St Louis, St. Paul, Minneapolis, Kansas City, Denver, etc., but naturally, this market will come in time. We find Long Island and Pennsylvania ducks advertised in the above named cities, and they find ready sale. Taking the average for the past year, we find the output of green ducks to be at least ten millions of dollars.

I have been asked to give you in a concise way the best way to interest and drive home the best facts to the farmer at the gatherings at which poultry interests are discussed. I can only speak from my own work. I find that the farmer and student wants practical facts, and he will take them home with him and apply them to the best of his ability.

The first thing I say is, "Well, boys, how many of you have note books; hold them up so I can see." What, only four or five; get some paper every one of you and make notes of what I say. Don't you know that the way to remember a thing is to make a note of it;

so sure as you do that you will never forget it. How many of you have the old-time mongrel fowls on the farm. Noted. How many of you have mixed flocks? Noted. How many of you have pure-bred flocks? Noted. Don't advocate the immediate disposal of the mongrel and grade flock as so many institute workers do, for you have the farmer's stinger out at once if you do, but show him plainly how he can bring his mongrel flock up to grades, and how he can bring his grades up to pure breed and with the investment of very little. Explain to him the best egg type and the best meat type of fowls and tell him how to select them. Tell him how to pick out the laying hens from the drones. Tell him how to select his eggs for market, and how to dress his fowls. Tell him how to feed for best results. Tell him how set a hen and how to care for the young chicks. Tell him what to do for gapes, for cold, for roup, for canker, for lice. Then have him ask you any question that comes into his head and answer it for him, and he will take home with him a storehouse of poultry knowledge that will ever do him good and such as he will make use of.

A Member: Please give us the best remedy for roup.

MR. CORNMAN: The best remedy is to prevent it. When you have it really bad, the best thing is the axe. If you have not got it bad, give them five or six drops of camphorated oil, and inject a solution of Chlorate of Potash or Peroxide of Hydrogen into the nostril.

A Member: At what age is a hen the best layer?

MR. CORNMAN: Well, a man should make it a rule to replace his flock every second year, and I would not keep a hen over two years.

A Member: How can you tell a chicken that will lay?

MR. CORNMAN: Well, you take your hen and put your fingers to her pelvis; if you can get one finger between the pelvis bone, she is not much of a layer; if two fingers, she is good, and if three, she is a fine layer.

A Member: Did not the fellow who invented that rule try to demonstrate it at the Maine Experiment Station, and go away disappointed?

MR. CORNMAN: To bring up a thing like that before an agricultural society does not amount to a snap of the finger, because it is a rule that will work; the experiments of the agricultural colleges do not help the people much that need it most.

A Member: They help me.

MR. CORNMAN: I am speaking of Poultry experiments as applied to the farm. I do not mean to say a word against the Agricultural College; my boy is going there now.

A Member: Then you say there is nothing in the failure of the Maine Experiment Station?

MR. CORNMAN: No; I do not say that.

A Member: A great many of the eggs for hatching are shipped quite a considerable distance, and often they fail to come up to expectations. Now, what can be done to increase the hatching percentage of these eggs?

MR. CORNMAN: The great trouble with these people is that they take ten times as many orders as they can fill, and when you get the eggs they are so stale that they will not hatch; or, again, many of these men keep their hens so confined that the fertility of their eggs is injured. I know that there is great complaint along that line. Now, I bought a thousand eggs for use at the Carlisle Indian School some time ago, that were guaranteed 65 per cent, fertile. We had a hard time to get 60 per cent. that were fertile out of them.

MR. COX: What is the best remedy for the gapes?

MR. CORNMAN: A little gape puller, but the best way to overcome disease is not to have it at all. It is the easiest thing in the world not to have it. In all the years that I have had chickens, I have not had a case of cholera on the place. It is not the chicken's fault, it is your own. For gapes, insert your horsehair with a loop at the end in turpentine and insert in the throat, give a twist or two and the thing is done.

MR. COX: You and I agree on the subject of the gape worm. I can take forty or fifty before breakfast. What kind of an instrument do you use?

MR. CORNMAN: A little silver wire, with a horsehair in the end.

MR. COX: I have never had much success with the horsehair as I have with that.

SECRETARY MARTIN: Can the hen be fed so as to increase her laying at the season we most desire it? Will the feed affect the color of the egg?

MR. CORNMAN: By feeding what we call "forced rations," and keeping her at as near summer temperature as possible, it can. Now, some of you know the conditions in New York City. They use a great many eggs, and want a large white egg. All over the State of New York you will find poultry owners with steam heating plants in their poultry houses, and they keep them as near summer conditions as possible. They get eggs during the months of January, February and March, and then they sell the fat white pullets to suckers who never get an egg from them.

MR. HOOVER: What is the cause of chicken cholera?

MR. CORNMAN: Neglect and dirt.

A Member: What is the best remedy for it?

MR. CORNMAN: Take charcoal, sulphur and ginger, in equal proportions and mix it with lard, make a pill the size of a pea and give daily.

MR. HOOVER: I find a strong decoction of white oak bark does very well; the chickens sip it, and it helps them.

A Member: What is roup?

MR. CORNMAN: Nothing but a neglected cold. If you correct the first symptoms of a cold, you will never have the roup. If you neglect that, kill the chicken.

MR. STOUT: Would you advise any one to take up the green duck business?

MR. CORNMAN: Well, there is money in them. I would advise any man to raise at least a few of them; you cannot buy the ordinary kind in our markets for less than 75c to 90c, and the Pekin will bring you $1.50.

MR. STOUT: Yet I understand that Gernerd, of Allentown, has gone into the hands of a receiver.

MR. CORNMAN: Yes; but he had too many other irons in the fire. He was interested in squabs and poultry. Now, just what he attributes his failure to, I don't know, but the duck industry is a paying one.

MR. HERR: Have you ever had any trouble with the little chickens getting diarrhoea and dropping over dead in a few days?

MR. CORNMAN: More young chickens are killed by lack of fresh air than anything else.

MR. HERR: They have the run of the range.

MR. CORNMAN: I would say, then, that they have access to something that gives them the disease. What do you feed them?

MR. HERR: Dry chicken feed, and ordinary dry bread, and oatmeal, yet three-quarters of the young chickens get diarrhoea and die of it.

MR. CORNMAN: It may be due to overfeeding, or by overheating and then getting suddenly cool.

MR. HUTCHISON: How about cockle in the chicken feed?

MR. CORNMAN: They will not eat it. Now, I am not here to advertise any feed, but it is not necessary to buy chicken feed with cockle in it. If you buy from the Prairie State Incubator Co., or the Cypher's Incubator Co., there will be no trouble in that direction.

A Member: It is new to you that the ordinary Venetian Red paint is a most excellent cure for cholera?

MR. CORNMAN: That is an old, old grandmother cure.

A Member: I was going to ask you as a chemist, what is the effect?

MR. CORNMAN: I am not a chemist; Doctor, what is it?

DR. PHILLIPY: Just an astringent.

MR. CORNMAN: This wide-spread feeding of horse and cattle powder, and all these other things, are just like the mania for taking patent medicines in the human family. It is entirely unnecessary, if ordinary care is taken to prevent disease.

A Member: How may gapes be prevented?

MR. CORNMAN: Well, in the first place, the location of your chicken coops has a great deal to do with whether you have gapes or not. If you plow up the land, you will be apt to have trouble with the gapes. There is a difference of opinion as to what causes gapes, but in my opinion it is caused by a little earth worm, which the chicken eats. If you put them on grass you will do better.

MR. RODGERS: At what age do you feed young chickens?

MR. CORNMAN: Not for the first forty-eight hours; after that I advocate the ordinary chick feed, as bought, but adding to it five per cent. of granulated charcoal, and five per cent. of grit.

MR. RODGERS: Would you recommend putting slaked lime in the poultry yard?

MR. CORNMAN: Not unless you turn it under.

The CHAIRMAN: Any more questions? If not, we will pass on to the next number on the program, "Poultry House Construction," by W. Theo. Wittman, of Allentown. Mr. Wittman is sick, and, consequently, unable to be with us, but he has sent his paper, which I will call on Prof. Menges to read to us.

PROF. MENGES: If you fellows have any poultry questions to ask, don't ask me; I am only reading the other fellow's paper.

The CHAIRMAN: You are not supposed to answer any questions; we are very well satisfied to have you read the paper only.

Prof. Menges then read Mr. Wittman's paper, which was as follows:

POULTRY HOME CONSTRUCTION.

By W. THEO. WITTMAN, Allentown, Pa.

In listening to the speakers ahead of me this afternoon, you have gained some idea of the immensity and the importance of the poultry industry. And yet I wish to say here, that few people on the outside have any real conception of what the immensity and importance of the product of this industry is. As an illustration, rarely quoted, take the matter of eggs annually going into cold storage. I understand up to this time this year no less than three and a half million crates have thus been put away. Three and a half million crates is one billion, two hundred and sixty million eggs. And to supply the tables of this State of Pennsylvania there is going to be paid out something like sixteen million dollars for such eggs next fall and winter. You deduct from this that many somebody's are missing golden opportunities to produce and sell practically unlimited quantities of new laid eggs in these months, at practically their own price, for there is a strong prejudice against cold storage eggs, so strong that a large per cent. of these hundreds of millions of

dozens of eggs now in cold storage are going to be sold as "strictly fresh." To figure out where all the eggs get to, you must allow every man, woman and child in this country considerable over one egg each per day, every day in the year.

There are immense possibilities in the poultry business, and the conditions are yearly making it possible to get bigger and larger profits out of the business. Or, take it as a side issue, or as simply poultry keeping on the farm and not as a business, a condition likely always to exist in a majority of our farms; I am entirely sincere when I would urge and insist that for many of our farmers it would be a better living, if more of them would pay more attention to poultry.

In many respects none of the arts of farming or livetock improvement have been neglected to the extent that poultry husbandry has. And this afternoon I am going to present to you a newer and better method of poultry housing; a method that has made it possible of late years for more and more people to go into the business of poultry keeping and stay in. Too many of our poultry houses have been and are today entirely unsuitable, or worse, for successful efforts at poultry keeping. This is equally true of the farm, the village or the town poultry houses. Last winter, in addressing various audiences in this and other states on this topic of more rational poultry housing, I used among others the following illustrations as to the poultry houses I have found: In the spring of 1907 I came across a poultry house built against the side of a hill with a sheer north, north-west exposure. To the south there was a belt of woods and a building or two, forming a pocket, effectually cutting off any winter sunshine. Although the season was well advanced, there was still snow and ice right up to this poultry building. For convenience, but aggravating the conditions, the large door, the fowl exit and the window faced the north. In that flock there were several hens with toes frozen off and one hen with toes so entirely gone that she was hobbling around on two stumps. Take the opposite extreme to this: Last winter in company with a brother poultry judge, we had occasion to take a trolley in Lancaster county to the home of one of its much respected farmers. This man had splendid out-buildings, as is the usual rule in this country of big red barns and other outbuildings to match, and he told us his poultry house cost him in the neighborhood of $800.000. It was built forty feet square with a four-sided roof rising to a peak. The entire four walls of the building were glass and there was not a bit of ventilation, and in spite of the fact that it was a bright, sunshiny day, the poultry was confined to the house, which was at that hour nearly or about summer temperature, and on account of continuous lack of ventilation, very damp. There were between two and three hundred head of hens, and I doubt if there was one that was not sick; colds, distemper, roup and liver complaint seemed to be the most prevalent; a catalogue of ills to discourage the most enthusiastic.

Now take another poultry house, on a hillside within sight of my own city. I had known it for years and that one of the scrubbiest and dirtiest flocks of hens within my knowledge owned it as a home. The house was a square, eight or nine feet, with a shed roof, no window or opening, save a door simply for the man to enter. The thing must have been fearfully overcrowded at night, but there

was no entrance or exit for the poultry, save a hole scooped out from under the sill. Well! I had no business there, but one day I boldly went up and opened the door. Nests, roosts, walls, were covered with excreta. There was nearly a foot of this on the floor and the odor that greeted me was nearly as thick.

There are variations and modifications of this on our farms, usually not as bad, often not very much better. Broadly, the trouble with many of our poultry buildings is that in their location and construction, there has been too much original originality. I find that usually inexperienced, wrapped up with the vanity or egotism of such a simple thing as a poultry house, or slavish imitation of poor examples was the guiding spirit.

Now, again, from time out of mind, the poultry back on the farm has shown a strong disposition to roost out of doors the year round. This was not, in our northern latitudes, conducive to winter egg production or even profitable poultry keeping. Hence arose the idea which has gained universal acceptance, that hens to lay well and do well in winter time had to be kept warm. And that a tight house meant warmth, particularly if a lot of glass were used. Now, the tighter the house and the larger the area of glass the poorer were the results, and many and many a dream of wealth in the poultry business has gone a-glimmering where such construction was followed. Colds, distemper, roup and a whole train of poultry ills or well-named "house" diseases were endangered, and there was nothing doing.

Some bright mind reasoned out the analogy of this and thus has evolved the curtain front, fresh air house; the sort of house I have previously spoken of as one of the prime factors in making it possible now to go into the poultry business as a business and stay in. That's strong endorsement enough, although I could easily spend an hour quoting endorsements and examples of the wonderful possibilities and results in this kind of house. Allow me here, incidentally, to refer to the great outdoor and fresh air sleeping movement in the human family; or how fresh air and sunlight (the companion of "fresh air" poultry house) are considered the prime requisites in our modern sanitary cow-barns.

The curtain front, fresh air poultry house idea probably originated in the New England States, and it is there this style of house is at present most in use and most believed in. I am stating this so that at the outset you who sit in front of me, may have your minds set at rest as to its practicability in the latitude of our own State. If hens lay and do exceedingly well, better than by any other method of housing, on the bleak New England hillsides, then they will do equally well, and do, in wide open or curtain front houses in Pennsylvania.

Pardon me for citing some of my own poultry of this last winter at this time to clinch my point: On account, partly, of being away from home continuously, we had only two dozen White Leghorn pullets at the home place. They were in absolutely wide open, to the south, houses all winter, not even a curtain; were constantly fed all grain in deep litter and on account of Mrs. Wittman wishing to spend some time with her mother frequently fed only once a day and occasionally only once in every two days. This latter did not entail the hardship it might seem for it meant the loss of only one

mash feed, as the litter being deep it worked out the same results whether the grain was put in for one day or two days. In fact, in this litter grit, shell, charcoal and coarse beef scraps were fed to last a week at a time. Well! these pullets, twenty-four of them, from the 10th day of October to the 10th day of March, or five winter months, laid enough eggs that were sold at retail to pay a profit over feed of $54.00, and not one of them had a frosted comb or a cold or roup or any disease, in fact, all of them were in high health and full lay every hour of the entire period.

Mr. Wittman here continued; reciting the history of how he came to adopt the fresh air plan eight and nine years back, when it was little known, and how he has been able to get maximum results with the minimum of trouble and disease since. He gave also a very apt illustration of what conditions and results are in poultry houses with glass fronts where same are not even removed during the heat of summer, and expressed himself as well pleased that he had had within the year at least half a dozen testimonies from parties who had listened to and heeded his advice to remove the sashes in summer in his address at the Normal Institute at New Castle last year. He also fully and at length described the principles of curtain-front fresh air houses and correct poultry house construction.

The CHAIRMAN: We have still a little time left before adjournment, and I think we would be glad to have Mr. Wing talk to us a little.

MR. WING: Twenty-four chickens paid a profit of $54 in five months, and only fed every other day! Now, my boy has some chickens, and every time I get home there is a little leak in the poultry income somewhere; my wife has some chickens, too, but they have never produced a profit of that kind.

I wonder how many of you realize what a wonderful lot God has done for you here in Pennsylvania, in giving you this fine soil, with its lime and its fertility, and its trees and its grass and its streams? Sometimes we are so taken up in trying to get out all that soil will produce that we do not stop to think of these things, but some day we will have learned our lesson better, and will be willing to learn something from the old world where they have been farming a few years longer than we have. Talk about Pennsylvania being an old State! Why, the oldest part of it is now over two hundred and fifty years old; some parts of it are two hundred—down here around York, for instance—and some only a hundred years old, while over in Europe they have been farming the same land in many places for a thousand years, and do not think of it as exhausted.

Now, I want to tell you about a little farm in the old world that it was my pleasure to see a few years ago; by the way, Mr. Chairman, is this a chestnut? Well, anyhow, chestnuts are good; most of us like them; so I will go on with my story. I had been going over the country a good deal to see how they did things over there; I went over Germany and France, and when I came to France I went to the Commissioner of Agriculture, and told him I wanted to see the finest farm in France. "That is a little difficult," he said; "we have many fine farms." "But," I said, I want to see the most per-

fect one, the one that is run in the best manner, and that yields the best returns." He thought a while, and then he said "M. Delacour is perhaps the best farmer in France, and he will show you many things." He sent for M. Delacour, who came to Paris to meet me, and we went out to his farm, which was about forty miles from Paris. About that time it began to dawn on me that I could not speak any French, and M. Delacour could not talk any English. Still, we conversed all the way from Paris to his farm. We would look out of the window, and when we saw something that we did not like, we would shrug our shoulders and frown, and when we saw something we liked, we would nod and smile, and we really understood each other very well. After a while, he waved his hands to show me that we were at his own fields; he had two thousand acres of the finest land I ever saw. Most of the farms in France are small, and it is a singular thing, I noticed, that where the farms are small, the families are large, and where the farms are large, the families are small; this was the case with M. Delacour; he had but one child.

We came up to his fields, and found the wheat just ripe for the harvest, being harvested with a McCormick binder, drawn by two yoke of big, white and cream-colored oxen. I find that these oxen are worked two or three years, and then sold. Then we came to a field of young clover, and then alfalfa, and then another wheat field, where the men, eight of them, with old-fashioned scythes, were just cutting the wheat. I took a scythe from one of the old fellows; the blade was rather short and very sharp, and I'm afraid I was not much of a success in using it, for he frowned, and shook his head; I was not doing it right. I never saw such grass as they were cutting there—common red clover, and alfalfa and a rather high grass all mixed together. I would say that about one-half or two-thirds of it was alfalfa. Then the women came along with little rakes, and raked it into little shocks, like buckwheat shocks. Wonderful that grass was—wonderful! And then we came to a beet field where they were growing sugar beets. Then another field of our Indian corn, or maize, as they call it in Europe. And then we went up a hill, and came to a little village of curious old stone houses, covered with straw, and on this straw were growing flowers in full bloom, looking very pretty. I learned that these were the homes of the laborers, who owned them, but not the land on which they stood. That belonged to M. Delacour. Finally, we went through a great archway in a high wall, and came presently to Delacour's castle. All along the east side of the great mass of stone was a stable—a great stable—where, at one time, I suppose, the soldiers quartered their horses, but which was now devoted to sheep, and those two thousand sheep there, were exactly two thousand healthy sheep. They had plenty of fresh air and dry clean straw, and you never saw more splendid sheep. On the other side of the great building was a large stable devoted to cows—dual purpose cows; if he had been here in Pennsylvania the Institute speakers would have told him that was wrong; he must not have dual purpose cows, but must have one cow for milk, and another for meat; but M. Delacour was unfortunate enough not to know anything of Farmers' Institutes! And then, on the other side, was another stable of splendid Percheron horses.

And then we went on into the house, where we found the governess of M. Delacour's little boy; she spoke some English, and acted as interpreter for us. I never saw anything quite so elegant as that old house, with its collection of fine pictures, and old armor, and its fine tapestries, and every window of that old castle looked out on the courtyard, out on the three sides that were stables, and right in the midst of that old courtyard was an immense pile of manure, which must have been treated in some way, for I could detect no odor. Well, I could not help looking at that pile of manure, which was visible from every window, and every room of that magnificent old castle. Then the governess said: "Mr. Wing, you gaze upon that courtyard, and I see your eyes fall on the great pile of manure. M. Delacour observes that you look at it, and he says to tell you that it is a fine pile of manure, gathered since his father's day, and M. Delacour says to tell you that every time he looks at that pile of manure, he sees what makes this place here so beautiful. From that manure pile comes the richness in the soil that feeds himself and all the men and women and cattle on the place." "But," I said, "why do you have it there; when will you put it on the ground?" "Just as soon as the ground is ready for it."

After a while M. Delacour and I walked out over the fields, and I dug my foot in the soil, and there was that soil that had been farmed for a thousand years—yes, these fields were old a thousand years ago—and yet they are richer than anything I ever saw in America. And then I said to myself, "Now, Joe Wing, you go home and see whether you cannot learn to do some farming. Grow alfalfa and clover, and feed it to the animals, and return that manure to your soil, and see whether you cannot get a soil as rich as this soil that has been farmed for a thousand years before you were born!"

M. Delacour had covered his manure pile over with fresh straw, and something to take the smell away; we still have some things to learn, in farming. Then he manured his land well, and used with it a soft lime, that he pulverized without burning, and that soil responded. And how that man loved his soil, and how glad he was to see the grass and clover grow! That is one thing we need in America, more than anything else—love and gratitude to God for what He has done for us, and then we can make this world here to produce in such a way as the world has never known.

SECRETARY MARTIN: As announced this afternoon, the cars taking us to York Haven tomorrow will leave the square at three o'clock in the afternoon. We, therefore, intend holding the session nearly an hour earlier tomorrow afternoon, in order that everybody may be able to go to see the York Power Plant.

The CHAIRMAN: The session this evening will open at half past seven, and the program will consist of a talk on "Profitable Sheep Farming," by Mr. Wing, another on "Starting a Flock of Sheep," by Mr. J. S. Burns, and one on "Breeding Beef Cattle," by Mr. E. S. Bayard, of the National Stockman and Farmer. I think you will all feel that you cannot afford to miss it.

MR. BLYHOLDER: I desire to ask the Committee on Resolutions to meet me in the parlor of the Colonial Hotel this evening at seven o'clock.

The CHAIRMAN: If there is no further business, the meeting stands adjourned until half past seven this evening.

Wednesday, May 26, 1909, at 7.30 P. M.

Mr J. Aldus Herr in the Chair.

The CHAIRMAN: The meeting will please come to order. I appreciate the honor you have bestowed upon me in making me presiding officer of the evening, especially as representative of the adjoining county of Lancaster, which we are all very proud of.

The first speaker of the evening is Mr. Joseph E. Wing, who will speak to you on "Profitable Sheep Farming." I have the pleasure of introducing Mr. Wing.

Mr. Wing spoke as follows:

PROFITABLE SHEEP FARMING.

By MR. JOSEPH E. WING, Mechanicsburg, Ohio.

Ladies and Gentlemen: Last week I had the pleasure of seeing the last of the sheep and lambs cleaned up on Woodland Farm, and shipped to the market. The lamb crop on that farm last year brought us about $12,000. I was much pleased until yesterday, when my brother said "Joe, if we had saved those lambs until this week, we would have cleared $1,500 more." I said, "Forget it."

In 1889 I came home from the west and took charge of my father's old farm, after having been cow-boy, rancher, and finally foreman of a large ranch in the west. The farm then did not have even two hundred acres, and you can imagine how I felt when I came home from one of the best ranches west of the Rocky Mountains, where I had been foreman. The foremen's stations on that ranch were forty miles apart, so you can imagine how small that little old farm of less than two hundred acres seemed to me. I was not there very long before I began to try to find excuses to go back, and what made it worse, I had a letter from the rancher saying "Joe, come back as soon as you get through with your visit." The amount of hay and grain on that old farm was so small, and the stock were so few! Father must have known what was passing in my mind, for one day he said "Come in here, my boy; I want to talk business with you;" and he took me into the sitting room and closed the door. Then he took down the old account book—a mighty careful man was father—and there set down in black and white was the number of hogs and cattle, and the amount of hay and corn and wheat, and everything; what he fed to the cattle, and what it amounted to—

and when I saw the figures, my heart went down like lead, for it amounted to a little less than $800, out of which the taxes, and the interest on the mortgage—for there was a mortgage in those days—had to be paid. "What," I said to myself, "have I got to come down to grooming and currying horses, and doing the work of a farm laborer, all for $800 a year? But father said "My boy; this farm may do better if you take hold of it; I am too old, and hired men are not good for much any more"—I wonder do you ever hear that in Pennsylvania? "When you was a boy, I helped you, and now that you are a man, let me be a boy, and help me; I need you." I studied awhile, and then I said "Yes, father; yes, I will; but you won't care if I make some changes?" He said, "I don't care if you turn the farm upside down." That was in the year 1890.

We walked down towards the barn, and the old sheep pasture; it was not fit to be a sheep pasture; it was wet and damp and cold, and full of crawfish holes. "Father," I said, "may I drain the field?" Well, I started in, and dug ditches in that old field, and laid tiles in, and by that time I forgot that old ranch to which my heart had been turning all this time. Now some of you people who have boys that are not interested much in agriculture, turn them out into the fields, and let them get the mud of those old fields all over themselves, and you will be surprised to see how soon they learn to love that mud, and the fields that produced it.

Well, I got some tiles laid, and then I began to get interested in watching that old field get dry, and I said to myself, "Some day, old field, I'll get you dry, and make you rich, and then you will grow corn and build a home for the sweetheart." And then I looked at my watch, and it was sundown, and I wondered where the day had gone to, and then I went down to see the sweetheart whom I married next year.

After we were married, I said, "Dear, I am going to get a little bunch of ewes; father always had some, and they will help to make this old farm rich, and fertile, so that it will produce more." The sweetheart was willing, so I bought a little bunch of ewes from a man who said he would deliver them half way, if I agreed to take them the other half of the way home. So, in November, 1890, the sweetheart and I—we were married then—drove down into the country to met the ewes. We took the old buggy—I have it yet—and started down the road. Pretty soon we heard the little jingling of the bells, and there around the corner came the ewes, and then the sweetheart reached out her hand to me, and I reached out my hand part way to her, as married folks are allowed to do, and we squeezed them a little bit, and she said "Oh, aren't they pretty?" And then we went home, she driving the old horse, and I walking and driving the ewes. We laid lots of plans over that little bunch of ewes. We took them home, and everything I could read about sheep I read—and lots of foolishness, too.

Oh, I learned what a good thing wheat bran was for sheep, and I bought a lot of it; and I bought cornmeal, and grain, and everything else that was supposed to be good for sheep, and those ewes certainly did thrive on that wheat bran. They looked fine and strong, and then when spring came the little lambs began to come, and a pretty time that is! And these lambs were dandies! They came so large and heavy. Why, one of them weighed seventeen pounds

when it was born; but its mother died, and then the little lamb died, because I did not know how to feed it. Then I began to see the trouble. I had fed those sheep until they developed too much bone and muscle. I had overfed on wheat bran. By the way, those that lived—and a good many of them did—made me money. Then one of my old neighbors who never overfed his sheep came around and laughed at me; he said, "Why, Joe, you overfed them; you should not feed them any bran at all. I turn mine out to pasture; sometimes I may have to feed them a little bit, but they take care of themselves. The next spring I got several hundred sheep to fatten, and then I followed the advice of my neighbor; I turned them out to pasture, and gave them fresh air and scenery—lots of it—and when the lambs came in the spring, they were a pretty good, live lot of little fellows. But the mothers did not care for them. I had not realized then that the ewe might be the very best, and yet not own her lambs, and then I learned this great truth, that a ewe that has no milk in her udder, has no love in her heart. It would have been funny, if it had not been tragic. That old ewe would look at me until I could hear her say "Joe, here is a lamb or two; take them and feed them; I have no use for them." And then I began trying to feed them, and the sweetheart who had no children of her own then, tried to help me, but we made rather a sorry thing of it. And then I learned the great truth that in order to have love in her heart, the ewe must have milk in her udder. I get lots of letters, these days, and many of them say the ewe won't own her lambs; "what is the matter?" Simply write one word below that question, and send it to the writer—and that word is "starvation." I had gone to the two extremes, because I did not know better; first, I overfed, and developed so much bone and muscle that the lambs had such a hard time being born that they died, and the mothers died; and then I had underfed so that the mother had no milk in her udder, and no love in her heart, and did not own her lamb, and they died for want of the mother's care. Of course, it is natural that you lose a certain percentage of the ewes and the lambs. When a man tells me that he had a splendid lambing time, and that his ewes and lambs all lived, I can't help but think of what the Psalmist says. "All men are liars."

It is a beautiful sight when the lambing season comes, to see the little fellows look up at you, and go to suckling their mothers. I love them; I love babies, and it is a mistake for any man to undertake to raise lambs who does not love them.

Then, when the lambs are here, comes the care of them. Out on the ranch, we had sometimes as many as ten thousand sheep, and out of the two thousand young lambs, there was not one that was not hearty and healthy. Why? Because they live as God wants them to live, eating naturally, with plenty of fresh air, protected only from the inclement weather.

Now, after they are born, what next? Teach them to eat something. We used to fix up a little pen into which to put the old ewe and her lambs, and get those lambs started eating. We started them on bran fresh ground from the local mill; we took forty pounds of cracked corn, and forty pounds of wheat bran and about ten pounds of oil meal, and got the little rascals to eating of it, and how they would eat, and how they would grow! The mothers were

kept with them, and when she was a good mother, and had lots of milk—we fed the ewes well—how she would love those lambs, and how the little rascals did thrive and frolic. It was a delight to see them. There was a man in our town who complained that he never made any money out of his sheep, no matter how he fed them! Well, I saw that man go in to feed his lambs one day, and he went about kicking them right and left out of his way. I was not surprised that he did not make money. We made plenty of money out of ours.

We mix up plenty of rations, and then give them an ear of corn, to teach them to get out the grains for themselves. We do not allow them to eat out of the same mess twice; what is left over we give to the old ewe, who is not quite so dainty as these little fellows. When they got to be about eighty pounds, we would sell them into the market. The very last ones went into the alfalfa field, and very little corn was fed to them. I told you we fed $15,000 worth this last year—hold on! We fed fifteen hundred of them, and they brought us $12,000. Most of these were not grown on the farm; we bought them last fall. We could not keep ewes enough on the farm —it is a little larger now, 320 acres—so we buy them in the fall and finish them. A pound of corn soaked in mother's milk will make a pound of meat on the lamb, and that brings us $9.50 per hundred pounds, live weight at Buffalo—yes, more than that, for the shorn western lambs bring that. There is no fear that the market will be glutted, for the eaters increase faster than the lambs.

You fellows have too many automobiles to look after the sheep. I have fed all kinds of sheep—even Montana wethers. Our big sheep gained eight pounds over winter, while the little lambs, the tiny fellows, gained eighty pounds. Do you people know that the younger a baby is, the more he gains in weight in a given time? Why, I have three boys at home, one a little fellow, one pretty nearly as big as I am, and the other one nearly grown—I used to know how old they are—their mother knows yet. I fed them a whole year, and then take them down once a year to be weighed. I have given up weighing myself in disgust; there is nothing to be gained by feeding me; I seem to be getting poorer all the time. I put the oldest boy on, and found that he gained eight pounds; the second one gained ten; and that blessed baby gained twelve. The animal bodies are all composed of little cells—these doctors and scientific fellows don't let you forget it. I stand here, and I am Joe Wing, but I am more than that, I am the Republic of Joe Wing, composed of thousands of little cells, each one complete in itself, built up one by one to make me. These are very active little cells, and they want to grow and multiply and get bigger, and increase the number of cells in the body. It is a hungry body, because it is a healthy body. A body that is healthy is always hungry, because these cells need this food to enable them to reproduce themselves. When the body is nourished, these cells divide, and each cell makes two, and in that way it grows. What is hunger, any way? These cells need something to make them grow, and they notify the stomach, and the stomach telegraphs it up to the brain, and says "I am getting fits because you don't send enough to feed these cells down here." The stomach has higher duties than we have; it has to feed those hungry little cells, which straightway divide, and make two, four, eight, sixteen cells, and it is by the rapid increase of these cells that the body grows.

Why don't you keep that hungry body fed? There is no money in keeping your blood poor.

A little corn fed these lambs now will pay more than a whole lot in the field, and more than a hundred pounds in two or three years. But how much corn? That is important. It is a pretty safe rule in feeding pigs or lambs, or anything else, to give them just a little less than they want. It has always been our endeavor to give them about three grains less than they want. Then they get hungry, and, oh, how good it tastes! If they have more than they want, there is nothing to stimulate the appetite, and it soon palls, and fails to taste good. And that is a pretty safe rule to apply to pretty nearly everything. Always go home five minutes before your sweetheart wants you to. When you come again, she is glad to see you, and draws a long breath, and says "Why, there is John! Come right in; I am glad to see you." But if you stayed five minutes longer than she wanted you, when you come again, she would look out and say, "Oh, there's that man! He makes me tired." And it is just the same with the little lamb. When he sees that corn, he says to himself: "Here is something that I could never get enough of under my apron; it must be awful good, and cost a whole lot, because they never give me enough of it; I'm going to eat all I can get of it."

Now, the alfalfa hay; we give them all of that they want. We used to feed that in the West, and I learned its value. Now, my brother is a little more economical in that respect than I am. He gives them practically all they want, but, just the same as with the corn, he stops soon enough to whet their appetite.

Now, as to the pens. We have two panels, about three and a half feet long, hinged together, so that we can set them down anywhere, and when the little lamb is born, we put the lamb and its mother in one of these little pens, so that they can become acquainted. How do you suppose the ewe knows her lamb? Not by sight, and not by sound, either. Now, I have seen a pretty sight many a time. Out on the ranch there would be on one side of the field five hundred lambs, and on the other side a thousand ewes. Now, the lamb knows its mother by her voice, and when he hears her calling he will say, "Thats my mother, and there's the dinner bell calling," and will run over to her, and find her. But the old ewe is not so sure that it is her lamb, so she takes him and smells him, and if she smells her milk on him, its all right; that is her lamb. She knows him by the smell. Now the way I get a ewe to take a lamb that is not her own, I put the ewe in the pen, and fasten her down with little stanchions, so that she cannot butt the lamb, and the little lamb will suck her, and in a few days it will smell like her milk, and she will own it, and love it. Once in a while a lamb dies, and then we skin it at once, and put that skin on another lamb, and give it to the old ewe. For about a day or so, the old ewe worries about her lamb, just as you do about your child, and then she looks at the little lamb that has been given her, and she smells it, and begins to think there is something funny about it; it smells like her milk, and in a few days she will have taken that lamb, and loved it. I have never known that to fail, either. Lots of these little tricks are worth knowing. But I want to go on further. I might say, before I do, though, that we make a practice of turning the ewe over to see that there are no tags of wool hanging to her

udder. If the little lamb should take any of these tags with his milk, he would get sick and die.

Anybody in Pennsylvania can raise sheep, but most of you have become afraid of stomach worms. Now, in 1896 I lost nearly all the lambs we had, and then I got busy and experimented a little. I was the first man in America who gave gasoline to the lambs, but we have not done that for several years. Now, I'll tell you something that will probably surprise you. My lambs chew tobacco like old soldiers. I do not allow them to smoke, because that is not good for them. But I'll tell you what we do. We get the tobacco stems from the factory—we can buy them for about $2.50 per bale of 500, and the sheep love them, and in order to get them to eat, we dip these tobacco stems in salt water—not brine, just salt water, and then give them no other salt. And we are not bothered at all with stomach worms or parasites. I have never known sheep to have parasites that fed on alfalfa. They may bloat some, but we do not often lose any lambs. Sometime ago I took a man out over my fields, and showed him my lambs, and I told him we had not lost any that year, when all at once, in looking over towards a pile of brush, I saw four little white feet sticking up to the sky; I quickly looked in the other direction, and said, "This is a pretty fine morning." And he left without seeing those little white feet pointing to the sky.

Another thing we do some years is to keep the lambs in the barn and soil them. It is surprising how much can be done and how little trouble it is to do it. Just give them some green alfalfa and then watch them lie down in the shade and eat it.

By the way, some of your young men who buy sheep and lambs may want to know how to find whether they are healthy. I will tell you. If you find them bright and lively, white, and pink around the eyelids and nose that is a good sign; pink veins—just catch one of them and hold him, but don't catch him by the fleece; I would just as soon catch a girl by the hair! Catch them around the neck and by the hind feet—I am talking about the sheep. Then go down the side to see whether the skin is thick. A healthy sheep is always a profitable sheep. I would not have a sheep with the foot rot in the barn. It is very easy to get rid of it. Put a trough of water so that he must run through it, and dissolve in it blue vitriol and some lime. The sheep will run through this, and for another year you will not be troubled with foot rot.

Just a little later I will answer some questions, but I want to go back to what the sheep did for Woodland Farm. Last year we produced about 10,000 bushels of shelled corn, and about 300 tons of excellent alfalfa hay, and this year we will do better. My father's corn crop amounted to about 500 bushels, and perhaps fifty or sixty tons of hay, and the rest was pasture and undeveloped land. We have sold the crops from these sheep, and this year we have sold the sheep, and sold some crops and hay because we could not help it. We expect to feed them all just as soon as we can do it. I can fit them for 10 cents, and if I can do this it will pay me to feed them. I get my manure for nothing; it goes into the ground for corn, and what little is left goes on the pasture. Don't believe any man who tells you that manure hurts pasture. Our experience has been that it improves pasture a thousand per cent. It has not made it watery for us. In England they lime it, and put on basic slag. I know a

man in South Kent who keeps thirty sheep to the acre, and that land has been used for many, many years, but he keeps fertilizing it; it keeps his sheep, and they fertilize it for him.

Now friends, if you have any questions to ask, I will answer them to the best of my ability.

SECRETARY MARTIN: Do you believe in dipping?

MR. WING: Oh, thank you. I think a man should be bathed once a month whether he needs it or not, and in the case of my sheep I do it once a year, although in the case of some of my old ewes I have let them go several years, but I have never found a sign of a tick or louse being on. I like to shear them myself. I can shear forty-five big ones in a day. Of course, the sheep that we buy in Chicago must be dipped.

A Member: Is there a difference in the staple wool?

MR. WING: I don't know anything about wool; I never grow any of the real wool sheep, like the Delaines or Merinos. I don't know anything about wool, as a matter of fact. I know we never get a high price for it. I don't think we ever got above 23 cents.

MR. PEACHEY: What is your breed?

MR. WING: I don't care to advertise—Dorsets, if you don't want any. If I lived in your country, I believe I would keep Dorsets, or Southdowns, or Cheviots.

A Member: Are the Dorsets prolific?

MR. WING: Well, all sheep are more or less so.

A Member: Very prolific?

MR. WING: Yes.

MR. SEXTON: Do you have any trouble with the scab?

MR. WING: I would not even bother with it in young sheep. If we have any, we just take a little of the mothers milk, and mix it, and rub on it, and it cures it. I believe all these things come from germs.

MR. HOLMAN: At what age do you like to get your lambs?

MR. WING: That is easier to tell by the lambs. There is a wonderful difference in sheep; there is no place in the world where quality tells better, and there is nothing that will yield a bigger income than a good herd of sheep. In England, on 1,400 acres of land I have seen 25,000 sheep kept; of course, it is done on the hurdling system, and they are raised largely on the vetches with which we cannot do so well here.

MR. COX: You would favor early shearing?

MR. WING: I would shear them in March or April.

MR. SEXTON: Should several large flocks be allowed to run together?

MR. WING: We have 700 in one field, but ordinarily I would not have more than 100.

A Member: Try to keep out dogs?

MR. WING: We try it; my brother has gotten so that he cannot miss a dog when he shoots at him. I always think it is not wise to buy strychnine in your own town. Get corks and boil them in lard. They have a perfectly corking effect on the dog. Try it sometime.

THE CHAIRMAN: Next on the program is "Starting a Flock of Sheep," by J. S. Burns. Mr. Burns is unable to be with us, but he has sent his manuscript.

SECRETARY MARTIN: We are in receipt of a letter from Mr. Burns. He has been for the last three months afflicted with rheumatism, and is therefore unable to be with us. We regret both his affliction, and his inability to be present with us.

On motion, duly seconded, and properly carried, it was decided that Mr. Burns' paper should be printed in the proceedings of the institute.

Mr. Burns' paper follows:

STARTING A FLOCK OF SHEEP.

By J. S. BURNS, Imperial, Pa.

In starting a flock of sheep, the prospective shepherd is presumably a young man without experience. And in such case we would advise a small beginning, because like every other line of farm operations, the greatest success is attained by growing up with the business. So a flock of 12 or 15 is large enough to experiment with. Now, some men of experience will tell you, it does not pay to bother with a flock of this size. But a wholesale venture without experience, is almost sure to result in disaster. Then he must outline his course. If he intends to produce thoroughbred animals to sell for breeding purposes, of course he must start with thoroughbred animals; and not only so, but with those of high individual merit; because farmers, and breeders, have become more discriminating, and only high-class animals bring first-class prices.

Then he must establish a reputation, not only for his stock, but for his own integrity and square dealing. And one disconraging feature on the part of a small beginner is, the public is likely to regard him with distrust, because of his lack of reputation. Also, in order to give his stock a reputation, and bring them forcibly to the notice of the public, he must make free use of printer's ink; and exhibit at a few of the leading fairs. We doubt if there has ever been a young breeder who has not had a keen ambition to appear with his stock, in the show ring. And it is the best piece of experience he can possibly have. For if he is a man of good sense, it will teach him, at least, two things—that there are others who have just as good, if not a little better stock than he has; and that he must accept defeat like "a little man," even though there be a little

bit of injustice connected with it. It is by comparison that we learn things of this kind, and by placing his stock side by side with that of others, furnishes a bit of education he cannot well afford to be without.

Now, the few things above mentioned, together with the first cost of suitable animals to begin with is expensive for a young farmer to start a flock of sheep, and I am not very enthusiastic about lending encouragement to a young man to start in the breeding of thoroughbreds. And I believe the foregoing is a very conservative setting forth of a few facts that should be duly considered, because beginners are sure to be infatuated with the seeming fabulous prices which experienced breeders sell their stock at, and think they can do likewise just as easy as not.

As to the best breed to start with—wool or mutton—would depend much upon the amount of range, and if he eventually intended to keep large numbers. If so, he would necessarily have to keep them in large flocks, and in this case the fine wools will best suit his wants, as they will do well in larger flocks than the mutton breeds.

But returning to my first suggestion to start with a small flock, we feel more inclined to recommend one or other of the mutton breeds. As a rule every one should select the breed he likes best. But a young man without experience is scarcely qualified to do this. So I fall back on my one conclusion which is based on actual experience, and will recommend one or other of the Down breeds. No serious mistake will be made in starting with good individuals of either of them. But for strong constitution, compact form, and choice product when placed on the block, the Southdown is hard to surpass, but is not noted for heavy fleece. The Shropshire is more growthy, will consume a little more feed, and produce a heavier fleece. And if wool and mutton is the object sought, this breed will meet the requirements quite as well as any. And if capital is limited, good grade ewes will produce just as good market lambs, by using a thoroughbred ram. But under no consideration use a grade ram of any breed.

And in starting a flock of mutton sheep the flock can be increased pretty rapidly by saving the ewe lambs each season, and marketing the ram lambs. But it will necessitate the buying of a new stock ram frequently to avoid inbreeding.

Located as I am near a good market, I cannot afford to raise my stock ewes, because I can get more for a lamb 3 months old, than I usually have to pay for a yearling ewe, by going where market conditions are less favorable, and thus save the keeping of the ewe lambs, with no profit from them but the fleece.

The best time to purchase the foundation stock for a flock of sheep, is an open question, and can only be determined by supply and demand. It is always a good time to start in any kind of stock when low in price, because an advance is sure to follow either sooner or later. But as a rule, about August is a time when more stock ewes are for sale than at any other time of the year. And this will give sufficient time to put the ewes in good flesh before being bred. And for a beginner, about October 10 is a good time to breed them. They will begin to drop their lambs about the first week in

March, and if a comfortable stable has been provided no better time can be selected all things considered, because a good mutton ewe, well cared for will have an abundance of milk for her lamb from then until pasture time, and the lamb will learn to eat dry feed more rapidly before being turned to pasture. And the addition of pasture later will increase the flow of milk, and by continuing the feed, the lamb will grow very rapidly; and can be made ready for market at from 2½ to 3 months of age, which is the most profitable time to market, because quick returns is what counts.

But on the other hand, if a good ewe is not allowed to drop her lamb until pasture time, care must be observed, or there may be a caked udder, and the ewe refuse to allow the lamb to nurse. Or, at least, there will be an over supply of milk to begin with, and acting on the same principle of a cow that is being milked by a careless milker—she will accommodate the flow to the amount consumed, and by the time the lamb is older and needs more nourishment it is not forthcoming.

CARE OF THE FLOCK.

Success with the incoming lambs depends much on the condition of the ewes. And it should be the aim to have them in high flesh, and maintain them so from breeding until lambing season. And if fall pasture is scarce, they should begin receiving about ¼ pound each, of corn and oats, increasing the amount as conditions may require until the beginning of winter, when they should be receiving about one pound to each 100 pounds of sheep, and all the roughage they will eat up clean. This should consist of clover hay, or clover and timothy, if cut when the timothy is quite green, and corn stover. If possible the stover should be fed on a stiff sod or on the snow in winter. If this is fed some distance from their shed, it will induce them to take exercise, which is very important. Stover is very unsatisfactory to feed in the racks, and shredded or cut stover is not very satisfactory feed for sheep.

During the winter the water supply should be carefully watched. It should be from a clean spring if possible, and so arranged that they can get it convenient. If they have to step in it with their front feet in order to drink, the chances are many of them will do without. A low trough is preferable if the flow is sufficient to prevent freezing.

Succulent food of some kind should be provided. Mangels are excellent, but rather expensive to grow. Turnips meet the requirements quite well, and are inexpensive to grow, as a catch crop, when sown among the corn at the last working. After the sheep become accustomed to them, they may be fed in almost any quantity the supply will admit. But usually a bushel to 25 ewes, once per day will answer, to aid digestion, and create a keen appetite for their food.

They should have a stable that can be made quite comfortable when necessary. But up until lambing time it is not advisable to keep them too warm. And at all times there should be good ventilation and free from dampness. There should be an abundance of room, and if possible, so arranged as to divide into two compartments, and increase or decrease the size of each. Then the ewes

having lambs can be removed from the main flock. It is a great convenience to have a few hurdles made of light material with which to construct small pens in corners, where ewes having twins can be placed for a few days, until they are able to follow. When the lambing season is at hand they should be closely housed when cold, and when mild, not allowed outside of a yard connected with their stable. At this time the shepherd's vigilance is in demand, for a ewe that fails to raise at least one lamb curtails the profits. And a little attention at the proper time often saves a lamb. If one becomes chilled and unable to nurse, a sudden heating is almost sure to cause death. Use a piece of soft blanket, well warmed, and folded several times. Roll the lamb inside of it, leaving a breathing space. And if possible pour about a half ounce of warm milk into it. A bottle with rubber nipple attached is convenient for this. When this has been done, leave the lamb and its mother to themselves, and the chances are that in a half hour the lamb will be on its feet.

When the lambing season is over, the ewes may be again in one flock, and a portion of the shed partitioned off, with a creep provided for the lambs to go through. A trough should be here with a sprinkling of bran in it. This the lambs soon learn to lick. Then whole oats should be added. And if the ewes are not receiving plenty of succulent food, the lambs should have a small addition of oil meal. When turned to pasture, cracked corn, or whole wheat should be added, feeding all they will eat up clean twice per day. And so feeding and caring for them they will soon be ready for the butcher.

After all lambs have been dropped, the ewes should be clipped as soon as possible. We often clip in March, selecting a mild spell of weather. Then keep them from wet and cold winds, and in a few days a cold flurry does not effect them, and they thrive much better.

The wool will have a more glossy appearance than it will later, when they are being reduced in flesh from nursing their lambs. And it avoids being soiled from the lambs tramping over them while lieing.

In conclusion, I must say, there are many acres of waste land in Pennsylvania being practically useless, where the natural conditions are ideal for sheep husbandry. The land is high and rolling, too much so for economical crop growing. Supplied with good water, and a natural growth of nutritious grass, which might well be utilized in this way, and thus add much to the yearly income of the land owners of this State.

THE CHAIRMAN: The next and last speaker of the evening will be Mr. E. S. Bayard, of the "National Stockman and Farmer," who will tell us about "Breeding Beef Cattle." I have the pleasure of introducing Mr. Bayard.

Mr. Bayard spoke as follows:

BREEDING BEEF CATTLE.

By E. S. BAYARD, Pittsburg, Pa.

There is no disguising the fact that for many years Eastern breeders of beef cattle have had a hard road to travel. When the free lands of the range territory and the cheap lands and cheap grain of the corn belt began to put cattle into market, the Eastern beefmaker was forced to turn his attention to something else, and with the beefmaker vanished to a large extent the breeder of beef cattle. Deprived of a market for his breeding cattle, for which he had previously found an outlet among the Eastern farmers, and unable to raise steers in competition with the ranges, he was in a bad fix to continue the business of breeding. It is true that the range and the West needed bulls, but it is equally true that breeders on cheaper lands nearer the seat of the demand, could and did supply them. Thus in all the territory east of the Ohio river, and in a good deal of it east of the Mississippi, beef herds were dispersed, vitiated with dairy blood, bred for dairy purposes, and otherwise lost to the beef business.

In recent years there is a slight tendency in the East to return to beef production. In the past fifteen years I have attended several meetings of this body, and this is the first time I have ever known beef to appear on the program. There are reasons for this. In the first place, the cost of producing beef in the West had advanced. Free grass is passing away, cheap corn is a thing of the past, and so is cheap labor. Taxes are higher in a comparatively new community, interest is higher, and in much of the territory engaged in beef production, lumber is higher than it is here. The cost to ship cattle is greater, and local markets do not exist as they do in the East. The beef producer of the East is not without certain advantages now; at least he may be called nearer equality with the Western producer, considering the value of his land, his taxes, interest and his markets. These things, as I said before, are making the East take more interest in beef cattle. In some localities we may find that the Eastern producer has decided advantages in even cheaper land and better local markets over the Western producer. The Eastern land has come to such a state that the farmer must raise some livestock. We have got into the habit of depending on the West for too many things. We must raise more ourselves. Another thing that has caused a certain revival of interest in beef cattle here, is the difficulty of securing help to carry on the

dairy business, the absolute need of cattle of some kind to consume roughage, the slight expense necessary for buildings and equipment, and the positive necessity of returning the products of the soil to the soil. Another influence is the utilization of all the corn crop by means of the silo and beef cattle. This is a great grass-growing State—and all flesh is grass. Beef is particularly a grass product, requiring comparatively little grain in its most economical production, as I shall show later.

I am not here to argue any man into dropping the dairy business for the beef business. Neither do I believe trying to combine the two. A successful dairyman needs a dairy herd and a dairy equipment, and he must work both to their full capacity to make a success of his business. If a man is going to be a dairyman, let him be a real dairyman and keep out of the beef business. I have never seen a successful beef dairyman who would not have been more successful if he had been a straight-out dairyman. But the dairy cow does not suit every one. Some men who can be, and are, good beef cattlemen, can never understand a dairy cow—can't see her right. Others are too short of labor, and cannot attend to dairy cows themselves. Others lack the buildings and equipment necessary to run a dairy properly, and especially those who have or can obtain these cheap farms we hear so much about, farms not usually well equipped with buildings. To all such men I commend the beef business—raising beef cattle or feeding them—as a way to greater fertility, and ultimately to profit. For I have faith in our markets for beef and faith in any territory as a beef-raising territory, which can grow grass. More and more our grass must be depended on to make our beef, and a State which grows grass will again produce beef to some extent.

While it may have been the idea of those who assigned me this topic to confine this discussion of the breeding of pure-bred beef cattle, I do not think this is the proper thing to do. Breeding pure-bred beef cattle must develop as the raising of cattle develops, to a certain extent. This subject is so vast that it must outrun any reasonable bounds if I attempt to discuss it in full, and so I shall merely outline it here and trust that you will resort to questions to bring out such points as you may wish to know more about.

THE MAN AND THE BUSINESS: The first requisite of a successful beef-breeding establishment in the East is a man who is determined to stick to the business and make it successful. The second is grass and water. The third is fences. The fourth is inexpensive buildings. The fifth is a set of scales. The sixth is cattle.

The two great branches of the beef industry worthy of attention in the East are: Breeding or raising beef for market; feeding or finishing cattle for market.

The man who expects to make a business of raising beef cattle in the East will find some decided advantages, as well as a few disadvantages in a herd of pure breds. The main disadvantage is the first cost, which is likely to be about one hundred per cent. greater in the case of pure-bred animals. The chief advantages are:

(1). Better cattle than grades.
(2). Uniformity.
(3). Better market for surplus females.

(4). More interest and pride in the business.
(5). Show steers.
(6). Occasional bull sales.

THE BREED.—Suppose a man decides to enter the ranks of beef-raisers, and to start in a modest way with pure bred animals. What breed shall he choose? It depends on what he is going to do with his cattle, and the kind of country he is in. If he expects to grow them on roughage and to keep them until they get some age before finishing, there is nothing better than the Shorthorn, because it will continue to make growth and pounds. If he wants to mature or ripen his cattle early, he should choose the Angus or the Hereford, which will fatten at an early age better than the Shorthorn. If he has sparse pastures and steep, the Devon may be useful if the old-time beefy strain of Devons can be found. The Shorthorn, the Angus and the Hereford, have one great advantage over any other breed in this territory, and that is the ability to secure sires to maintain and improve the herd near at hand. For this reason I would suggest that one of these breeds be chosen rather than a breed comparatively rare in this territory. If any breeder or cattle-raiser near by has the breed adapted to your purpose, choose it, for there are advantages in doing so, too obvious to mention.

HERD FOUNDATION.—In choosing the foundation for a herd, get the required type in mind, and then get individuals that represent that type. I do not believe in going to any extreme in fashion of pedigree, color, form or size. The medium ground is safest and best for the man who wants to produce good beef cattle. Fashions are costly and transitory. The *family* fashion, which restricts choice to the descendants of certain female lines, is particularly foolish for any man to adopt who does not intend to breed cattle to head pure-bred herds. It is a commercial necessity for some of these, but it is a false foundation and any structure reared on it alone will ultimately fall to the ground. Learn what beef merit is and buy cattle that have it and whose ancestors had it. Then you are pretty sure to get it.

THE COWS.—The basis of a herd of profitable cattle is the cow. The best and cheapest way to buy a herd is to select young cows with calf at foot and in calf again or bred again. Younger animals, yearling heifers particularly, are more attractive to the eye, and have one advantage—they are guaranteed to breed. A cow with calf at side has no such guaranty further than the calf, and at the buyer's risk, but this risk is very slight.

DESCRIPTION OF COWS.—In selecting a cow herd lean to the roomy type, but avoid coarseness, especially projecting hook bones, long flat ribs, high tail-heads, coarse heads and long legs. Above all, avoid the steery cow. The rule of all nature holds good in selecting the matrons for a beef herd. Don't get a masculine or steery type of cow; get a cow of pronounced femininity. There are several good reasons for this, but the first and greatest of all is that these cows are the best mothers. Look over the cattle you know, regardless of breed, and you will always find that the feminine type of female will produce the most masculine type of male and the most feminine type of female. And this is important to any breed-

er of any class of animals, for buyers of intelligence want masculine bulls and feminine heifers. There is one other important reason for choosing a feminine type, and that is, unless you do choose this kind, your cows will lack milk, will not raise their calves properly, and are likely to cease to breed and go fat to the market just when they should be in their prime.

The Milking Properties of the beef breeds have been grossly misrepresented, yet, as in all such cases, there is some foundation for the false idea that exists. A beef cow that will not raise her calf well is of little use to any breeder, and beef breeders must of necessity consider milk, and always do.

EASY FLESHING.—This is a term often misunderstood. Most people think that this quality in a beef animal means merely ability to put on flesh quickly and at little expense. "Get fat on nothing," is what we often hear. There are two classes of easy-fleshing animals in the beef breeds. One class consists of those steery cows that always carry flesh, and these are to be avoided. The other class consists of cows which milk well, lose flesh quickly while milking, and pile it on rapidly and economically when dry. As a rule among beef cattle, the cows which take off their flesh most rapidly put it on again most quickly. These are the real easy-fleshing cattle, the kind to get and stay with.

THE BULL.—For exactly the same reason as given for selecting feminine cows, choose the masculine bull. Get some size, or the promise of it, in buying a bull. Bone enough, loose hide, "stretchy" but not too thin, good hair, not coarse, but abundant in season when needed. Get a bull with what might be called an honest countenance; not long-nosed, narrow between the eyes. Pick for correct lines—straight—thick or broad any way you look at him. Eyes placid and not deep set. Hocks not too straight or too crooked. Loin strong. Twist well developed. Forelegs well apart when in flesh.

PRICE OF BULL.—The East will never have good beef cattle until its people learn to pay a decent price for a bull. A calf is all the income a beef breeder has from his cows, and he cannot sell these calves at extremely low figures. Besides, any good beef-bred bull will sell when aged and fat for enough to replace himself with a bull calf or a young bull.

MANAGEMENT OF BULL.—While it should always be remembered that a bull is not a pet or a plaything, as a rule, a beef-bred bull should not be handled as many people handle dairy bulls. His temperament is different, and he should be handled according to it. I have seen some wonderful plans for handling bulls. In some the bull is kept in a high walled prison and prodded to and from his duty. In others he is strung on a trolley car by a ring in his nose. No such course should be taken in handling a beef-bred bull. I consider the ideal plan to have a blue grass pasture well fenced, with a small barn or shed in one corner and a small yard, of which it may be part of one side. Give the bull a companion—cow or steer—and he will rarely become ugly, can be handled with ease and safety, and his abundant exercise and quiet mind must surely tell on succeeding generations.

FEEDING THE BULL.—A well-bred beef bull will do good work and keep in fair condition on grass alone; but he should have some grain to develop him properly unless the grass is very good. There is such a great difference in individual bulls, in their temperament, fleshing, etc., that no rules for feeding can be given. As a general thing, a beef-bred bull can stand more corn feeding than is usually prescribed. Corn and oats are about as good a combination as can be found for a service bull. Any feed that keeps him thrifty is all right, and the cheapest is the best, as long as it does this.

FEEDING THE COWS.—The feed for cows will vary according to what they are doing. Dry cows can be kept very nicely on clover hay alone, will take on flesh and raise good calves if wintered on it only. In summer dry cows and nursing cows too need only good grass. Cows nursing calves in winter should have grain in addition to their hay. Silage and clover hay if liberally fed, ought to make them and their calves prosper. I usually feed hay and a little corn or corn-and-cob meal and oil meal to nursing cows, but the grain ration is not heavy. The profitable way of keeping cattle is not always the ideal way. If we are to make anything out of beef cattle in the East, they must not be kept in showy condition, but in working condition. Mumford found by experiments that 18 pounds silage and 4 pounds clover hay, with access to straw stack, caused dry cows to gain 1 to 1¼ pounds per day. Or 10 pounds of shock corn and 4 pounds clover hay and straw *ad libitum* wintered them well. These amounts per 1,000 pounds weight of cow. Cows can be wintered on less than these rations, but they will not milk so well after calving as when fed better; and milk makes calves.

CATTLE BARNS.—Cattle barns, as dairymen understand them, are not necessary for beef cattle. The best beef cattle barn is a shed or barn free from drafts, into which they can go at will. It may be that cows with very young calves will prosper better in a warm barn when the weather is severe, but these too will soon be better in the shed. It should be tight above, and free from cracks or draughts. Leave it open on the side from which winds do not come—or build a straw stack across the entrance a little distance away, or use any plan to keep it open and yet not windy. Beef cattle care little for cold. I do not believe any breeder can afford to house his cattle all the time. A dairyman may do it with profit if he is constantly buying, forcing and selling cows. No breeder can afford it.

WATER.—The best water for cattle is that which comes directly out of the ground, is not chilled by standing in a trough where ice can form. A spring is best. Cattle like a little mud in their water, and do best when they have it. All cattlemen, and especially those who keep their cattle in warm quarters and under high pressure, should give them a bite of fresh dirt now and then. The most successful dairy feeder I ever knew did this, and I find that many older cattlemen have practised it with good results. Cut a piece of sod, and give them a bite of it.

THE CALVES.—The spring calf has some great advantages to the man who wants to make beef of him economically. He can be

put on the market as a feeder or as beef when a long yearling, and most of his weight be made from grass, as he sees only one winter. The cost of keep must govern the method of growing beef. It is a possibility with the early-maturing breeds to make an occasional steer weigh 1,000 pounds at twelve months and have him ripe enough for any trade. This is baby beef in the quickest time, but it may not be the most economical, because it requires too much expensive feed. It may be better to use more grass and less grain and have them go to market at eighteen months at 900 to 1,000 pounds. One distinct advantage of the Eastern beefmaker is that he can usually dispose of one or ten steers near home, and can send them off whenever he gets them ready. A long yearling steer should fetch $5 to $6 per cwt., if he is ripe enough, and that means $50 to $60, which ought to pay him for his grass, for his grain, and the economical keep of his dam, which is in the meantime producing his successor. Feeding all this stuff on the farm and buying a little every year will make it more productive.

FEEDING CATTLE.—The man who buys cattle to feed has a big problem ahead of him. Good feeders are hard to buy, costing at present $5 to $6 per cwt. But it is sometimes more profitable to buy them than to breed them. The winter feeding proposition usually involves too much plowing for the growing of grain, and too much labor to make it highly profitable in the East. I believe that as a rule it will pay the Eastern beefmaker better to merely winter his steers and to finish them on grass. And here is an important point—when steers are to be finished on grass, do not winter them too well. Have them thrifty but not fleshy when they go on grass. Otherwise they are likely to do no good, and even lose flesh, and often so much of it that they are no better by July 1st than when turned out, if as good. If grain can be fed on grass this may not apply, but it is a question whether it pays to feed grain in the early part of the season. Not a few experiments have been made which go to show that grain feeding on grass does not pay, but my experience has been that it does pay toward the finish. A little grain on good grass goes a great ways toward ripening a steer.

KIND OF STEERS TO FEED.—The kind of steers to feed cannot be described here because of lack of time, but the class may be touched on briefly.

First, calves bought from the ranges. These require a long feed, usually one whole winter and one summer and a part of next winter to make them prime. Ordinary range-bred calves cost $15 to $25 per head and when ripe sell at $40 to $70 per head, according to their quality and finish.

LONG YEARLINGS OR TWOS.—A great variety of methods of handling these. Buying in fall, roughing through winter, finishing on pasture alone, is one method. A gain of about 300 pounds is about what may be expected with good steers well kept in this style, and an advance of $1 to $1.50 per cwt. on the original purchase price. Another common method is to buy feeding steers and finish with grain, not usually a profitable business here, where grain is so costly. Another method is to buy steers in good flesh and finish by a short feed. This is a ripening process, for which Eastern markets do not pay proper reward, as a rule.

QUALITY OF STEERS.—Remember that the feeder can sometimes make most money off the plainest steers because they are the cheapest. The cattle raiser always loses here, but the feeder can sometimes profit by his mistake. Plain cattle make more improvement in class than better ones do—a fat steer usually goes up a notch in classification over his feeder class. Remember, also, that a cheap steer requires a larger feeding margin than a dear one. A 1,000 pound steer costing $4 per cwt., gaining 300 pounds, and selling for $5, shows a margin of $25. A 1,000 pound steer costing $5, and gaining 300 pounds, selling at $6, same advance as the other, shows a margin of $28. He usually requires less feed to put him where he will fetch the $1 advance on original weight.

A Member: How about the taxes on land.

MR. BAYARD: I don't believe that the taxes in Pennsylvania are higher than they are in the West. In fact, in a settled community, I don't think they are as high.

MR. WING: We have had the same experience; we feed very little but alfalfa, clover or silos, and have more gain that way than any other.

MR. BAYARD: The silage made the cheapest gain, and the cattle ran very high.

How many beef breeders are there in the audience? One—two—positively in the minority!

SECRETARY MARTIN: There are quite a good many beef cattle fattened in Lancaster county.

MR. HERR: There have been as high as 260 carloads of cattle a week from Lancaster county.

MR. BLACK: It depends very much upon what Shorthorns you get.

MR. BAYARD: The new Scotch cattle mature much easier than the old type.

SECRETARY MARTIN: At what age do you think it best for an animal to be entered into the proper feeding to make the biggest beef?

MR. BAYARD: You mean a steer? That depends on how you feed him. If you buy a steer, always buy one with some age, because he gets fatter as he gets older. He is like most men in that respect.

MR. BLYHOLDER: In growing them yourself, at what age are they most profitable to sell for beef?

MR. BAYARD: That, again, depends upon the character of your farming. The main thing is grass and young corn; it is not advisable to make baby beef. It would be better to keep him on grass, and after the first grain to push him to about 18 months. If he has made good in the spring, or he has made one winter, it is all right, but it cannot be done on faith. It all depends upon how you are

located in that respect. I have known steers to make a hundred pounds a month, right along, but I don't say everybody can do that.

MR. McCLELLAN: Where would you go to get a good dairy cow?

MR. BAYARD: I think I would go to some good breeder.

MR. McCLELLAN: But the trouble is that the breeder wants to sell you his worst.

MR. BAYARD: But his worst may be better than your best.

MR. McCLELLAN: But if you want to buy a No. 1, you want to buy what he does not want to sell.

MR. BAYARD: Well, he may sell you just as good cattle for you at a reasonable price, or you may get something that he can sell to a dealer at a higher price than you can afford to pay.

MR. CLARK: Do you think it would be an advantage to the farmers of this State, to invest in good sires to cross with their grades, and let a pure bred herd grow up in that way?

MR. BAYARD: Yes, sir.

MR. CLARK: Is it not a fact that the breeders in Texas are importing bulls from Kentucky for breeding to their herds?

MR. BAYARD: Yes; that is the way they build them up in Kentucky, too. Dan Black always buys his calves from young heifers. Why does he do that? Because these young calves make in two or three crosses better cattle than the older ones. If you go to buy cattle, buy them from young ones; you have that many more crosses on them.

If I were going to Chicago to buy a lot of cattle for the Pittsburg market, I would take what is called a "handy" lot, because they suit the Pennsylvania market. They can be fattened on less feed. I saw some sold last week for $5.86 that ran from 800 to 850; I saw one full grown steer that ran 700 pounds, and there were some that ran from 1,200 to 1,250.

MR. HUTCHISON: Would you buy them in the spring or in the fall?

MR. BAYARD: That depends upon the grade.

A Member: If you were going to feed them for a while?

MR. BAYARD: Well, my experience has been that there is no safe rule to go by. The cheap, scrubby kind sometimes make the most money. You buy a steer at 4 cents, and put 250 pounds on him, and sell him at 15 cents—a wide margin between the buying and selling price, even counting the feed. If I were buying in the Pittsburg market, I would buy cheap cattle, because they make the most money. I would buy cattle of about 800 pounds, and put them on the market light, because I think they make the most money.

MR. HUTCHISON: Is there not the greatest profit in a steer when he is about 1,000 pounds?

MR. BAYARD: That depends on the steer. There are some steers so common that there is no profit in them at any price. No matter how you raise a common steer, there is no money in him. A good steer will sometimes make a profit for the man who fed him, but not for the man who raised him, but a common steer will do neither.

A Member: My experience is that a man can make some profit on a common steer, even if you keep him until he is 1,500 or 1,600 pounds.

MR. BAYARD: I don't think in Pennsylvania a man has any business to keep cattle up to 1,500 or 1,600 pounds.

A Member: My idea is that he should give more for his first three hundred pounds, than afterwards.

MR. BAYARD: It costs more to make it.

MR. McCLELLAN: Do you find cattle in the Pittsburg market that you can take out and make anything off?

MR. BAYARD: Not at this time of year.

MR. McCLELLAN: In the fall of the year?

MR. BAYARD: Yes; but not often. I saw cattle sold at $5.58 that had no meat on them.

A Member: What is the best water for cattle?

MR. BAYARD: The best water is right out of the ground. Let them drink it; you will find cattle will do better if they drink the water right out of the spring or stream.

Now I think you ladies and gentlemen are ready to adjourn.

SECRETARY MARTIN: I would like to ask Dr. Hunt to speak to us a few words to-night. He expects to be with us to-morrow, but I know the audience would be pleased to have him say a few words to us to-night. Dr. Hunt, will you please come forward?

DR. HUNT: Mr. Chairman, I am certainly very much embarrassed, because I have nothing to say to this audience. I have no message for them. I came down here for the purpose of shaking hands with the farmers of Pennsylvania, who are assembled here, and not with the idea of making an address of any sort. As, I say, I have no message for you at all. I suppose I have got to say something, and therefore I will tell you just a word or two about some experiments that happened to interest me, because I have been working over the data.

You all probably know that the Pennsylvania Experiment Station has been carrying on some fertilizing experiments covering more than twenty-five years. I had the opportunity of presenting a series of these experiments at your meeting in January, and they are published in bulletin form. As you know, they are the most complete experiments in America. I was looking over the data to see what lessons can be learned, and I find that in 36 plats, in a tier, and four tiers, the rotation was corn and oats, and wheat and hay, on one of these tiers, and we had twenty-five crops each, and fertilizer was applied in twenty-four different ways. The result was that we eliminated the soil conditions, because we have the rota-

tion here, so that corn and oats and wheat and hay have grown in regular rotation, so there is no difference in the soil. Now, you may be interested in the price. The price at which we estimated these are, 80 cents a bushel for wheat; 50 cents for corn; 32 cents for oats, and $10 per ton for hay.

Putting the figures on this basis, we find that during the past twenty-five years the income from the corn crop has been worth $30 an acre at 50 cents a bushel; if figured at 75 cents, it would have brought $45. It has been $18 an acre for wheat and hay, and $15 an acre for oats. Now, under conditions that are absolutely the same during a period of twenty-five years, up there in Centre county, 1,200 feet above sea level, the income from the corn crop has been made double that from the oat crop.

MR. BAYARD: What would you suggest to take the place of oats?

DR. HUNT: I am not suggesting anything.

MR. BAYARD: But that is what we want you to do.

DR. HUNT: But I don't always do what you want me to do. It makes no difference whether you have the four years' rotation of corn and oats and wheat and hay, or whether you have a five years' rotation, with two years' corn, followed by oats and wheat and hay.

Then I want to make another suggestion to you in which I am interested in behalf of practical information, and I want to get your opinion. The various experiment stations of the country have been asked from time to time what is the matter with the oat crop—I know I am often asked. I got a letter last summer from a man in Manitoba; he cited the conditions there; the same thing in York, and in Lancaster counties, and everywhere else—"We cannot raise oats." In New York the same conditions prevail; they cannot raise oats in some of the counties. Now the question comes: Is that a fact that we cannot raise oats any more? I want your judgment on the matter.

A Member: It is the case in Butler county, I know.

DR. HUNT: You do know? The assistants in the United States Department of Agriculture do not see any falling off. Now these experiments of ours for twenty-five years have allowed us to see how the oat crop compares with the other crops financially, soil conditions being the same. Where we have given the soil no fertility of any kind, the oat crop has failed faster. Where we have done so, we have increased the corn and the wheat crop 25 per cent., but not the oat crop. Taking the indications for the last five years, as compared with the last twenty-five years, we find that the oat crop has only averaged two-thirds of what we would expect from the yield of the other crops.

Now, gentlemen, I have absolutely no suggestions to make that might be of practical value to you, but you can understand that in a country where we raise nearly 1,000,000 bushels of oats in certain years it is a question that is of interest to us, if the oat crop should fail.

A Member: Why not cut the oats out now?

DR. HUNT: I would say there might be no objection to it in your locality, but that would hardly apply to the whole United States.

A Member: How much fertility do you use per acre?

DR. HUNT: In these different experiments? You will understand that we have a series of experiments, 36 plats in a tier, treated in 24 different ways. For instance, where we had the rotation, we find that 24 pounds of phosphoric acid, and 100 pounds of potash per acre, have been able to keep up the fertility absolutely in a four-year rotation. Now, I might answer that in another way by telling you that where we have applied these two mineral fertilizers and 24 pounds of nitrogen, we have kept up the soil just as well as where we applied manure.

MR. STOUT: May I ask if you have been using the same kind of seed right along?

DR. HUNT: Yes, sir.

MR. STOUT: The same kind of oats?

DR. HUNT: Not altogether.

MR STOUT: Oh, yes; but there have been some changes made in the twenty-five years.

MR. HOLMAN: Is it not a fact that oats is susceptible to the weather conditions more than any other crops?

DR. HUNT: Yes; but I think that in our case we have eliminated the weather conditions. There is no reason to suppose that the weather conditions for the past five years have been very different from what they have been in the last twenty-five, which I am comparing. There is nothing in the record of the wheat crop or the hay crop or the corn crop, and nothing in the record of meteorology to indicate this.

MR. HOLMAN: But it is a weather crop; I raised one year 80 bushels, and the next year 16 bushels, under the same conditions.

MISS BAKER: Down in Chester county we don't use the fancy Western seeds for our oats, but we go right to some farmer in the neighborhood, close to home, and get some seed that is grown right there. The same seed has been planted for sixty or seventy-five years, and I have never heard of a failure of the oat crop. I believe the failure is largely due to the fancy Western seeds that are being planted.

DR. HUNT: There is absolutely no doubt but that the home raised seed is better in any given locality than the Western seed.

Now, Mr. Chairman, I have told you this, not because I had a message, but because I had to say something.

I want to say a word to our good friends here, about the appropriations we secured from the Legislature for the Department of Agriculture at State College. We did not get the new Horticultural Building, in which we are all so much interested, but when we got

before the committees, and the Governor, and told them what we wanted, they were very generous to us. Two years ago our appropriation was $70,000 for the two years; this year they gave us $170,000, an increase of $100,000, so you can see that your efforts have been rewarded. This increased appropriation is largely due to your efforts, and I want to make this public acknowledgment of your assistance and thank you for it.

The CHAIRMAN: We appreciate the Doctor's remarks very much, indeed.

Now, if there is no further business or discussion, the next in order will be adjournment until 9 o'clock to-morrow morning.

SECRETARY MARTIN: I move we adjourn.

This motion was properly seconded and carried in the regular way, and the session adjourned until Thursday morning.

Thursday, May 27, 1909.

9 o'clock A. M.

SECRETARY MARTIN: The meeting will please come to order. Some gentleman sitting on the seat to the right here, left some change lie on the seat. He will please call and get it.

Mr. McGowan, who was appointed Chairman of this meeting, is not present, for reasons with which you are all acquainted. In his place, Mr. I. A. Eschbach will take the chair, and take charge of the meeting. We have on the program this morning two very important subjects, and I am sure you will all be interested.

Mr. Eschbach will please take the Chair.

At this point Mr. Eschbach took the Chair.

PROF. MENGES: Mr. Chairman, may I make a little announcement? The York Haven excursion will run, rain or shine, and we will take care that you keep dry inside and outside. Some of these people seem to think that this is rather a difficult thing to undertake, but we will at least try it. We expect everybody to go this afternoon at 3 o'clock.

SECRETARY MARTIN: I desire to say, while we have the thought in our minds, that we have a very important discussion this afternoon, relative to the work in the State, and we want every institute lecturer, and county chairman to be on hand. There will be important questions to be discussed of interest to us all. We can easily get through our afternoon session by beginning half an hour earlier, and then we can all take in the trip to York Haven. So let everybody be here at 1 o'clock this afternoon.

MR. JOEL A. HERR: It seems to be the general opinion that there is not time enough devoted to this important topic at our annual round-up meeting. I therefore make a motion that we ask the secretary to devote one entire day to the institute work—not an afternoon, but an entire day. I make that as a motion.

MR. BLACK: It seems to me that this matter of arranging the program should be left entirely with the Director of Institutes, as it is now.

SECRETARY MARTIN: I have no objection to this change in the program whatever, and if we find this afternoon that there is not time enough for those who wish to be heard to finish the discussion, I would suggest that we continue that discussion, and hold another session on Friday. I will be pleased to stay here on Friday afternoon. If it would seem desirable, we will devote an entire day to the work. We will let the afternoon decide whether it is advisable to continue the session to-morrow afternoon. The matter can be taken up at the close of the afternoon session.

MR. J. A. HERR: It seems to me that when a man gets up to speak, he does not get more than half way across the country before his time is up; I was only trying to get an expression of opinion.

MR. PHILLIPS: It strikes me that Mr. Herr is making a rather extraordinary proposition, one which reflects on the Secretary, and I would suggest that as an expression of our confidence in him, we all vote "no."

MR. KESTER: I would suggest that the motion be laid on the table until the close of the afternoon session.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: The time has arrived when we will take up the program of the morning. The first topic is, "The Indigestible part of the ration of a Dairy Cow," by Prof. Wells W. Cooke, of the United States Department of Agriculture at Washington. I have the pleasure of introducing Prof. Cooke.

Prof. Cooke read the following paper:

THE INDIGESTIBLE PART OF THE RATION OF THE DAIRY COW

By PROF. WELLS W. COOKE, Washington, D. C.

Speakers and writers on the subject of the feeding of the dairy cow are accustomed to devote most of their attention to the digestible part of the ration. Since it is only the part digested that is of any use to the animal as a source of material for the production of meat, milk or butter, it is natural that this part of the ration should be given the most prominence. Nevertheless, when a closer study is made of the subject, it will be found that the furnishing of a proper amount of indigestible material is an important matter in profitable dairying, and that the best feeders are very careful in practice to treat the cow properly in this regard, though they would not be able to state explicitly in pounds per head per day, the needs of their animals.

Two examples will make this point clear. Twenty-five pounds of bran contain all the digestible material needed by a thousand pound cow for a day's rations, and these digestible materials are in a good proportion, yet no dairyman would think of feeding his cow nothing but bran, even though bran was the cheapest feed on the market. He would say that such ration was too concentrated; that the large first stomach, or paunch, of the cow, that nature expected her to consume large quantities of coarse, bulky fodder. On the other hand, thirty-five pounds of good clover hay also contain the digestible nutrients for a day's feed, yet the dairyman would not expect a good cow, in full flow of milk to do her best on a ration of nothing but clover hay. He would say the ration was too bulky; that in spite of her large paunch, the cow could not eat enough clover hay per day to do her best. It will be noticed that in each of these rations, the trouble is in the indigestible part. Each contains the proper amount and kind of the digestible nutrients, but the first does not contain enough indigestible material to keep the animal in health, while the second contains too much indigestible matter for the cow to do her best. The purpose of the present discussion is to find the happy medium between these two extremes.

Many years ago, German experimentors announced that a dairy cow weighing a thousand pounds, required in her daily ration 2.5 pounds of digestible protein, 0.4 pounds of digestible fat, and 12.5 pounds of digestible carbo-hydrates, giving a nutritive ratio of 1:5.4 This is commonly called the German standard ration for the dairy cow. Much effort has been expended in this country to prove that this German standard is higher than necessary in digestible protein, and it has been shown that under some conditions a cow will do well with a smaller proportion, yet it is remarkable how close an agreement with this standard will be found in the rations of the best feeders in the Eastern United States. This agreement is especially close in the case of dairymen furnishing milk for the retail trade of cities. These dairymen are, as a rule, milking a good grade of cows, and are feeding them heavily on the highest priced materials, and yet without figuring on chemical constituents, experience has taught them that they get the most return for the money expended when they use fodders so rich in protein that the ration comes up fully to the German standard. It is known now that no one standard will do for all cows, but that the quantities of feed have to be varied according to the amount of milk produced—the larger the milk flow, the larger the ration. Later investigations have also shown that the proportions of digestible protein needs also to be varied—the larger the milk production, the larger the absolute and relative amount of digestible protein, i. e., a cow giving a large flow of milk requires a narrower nutritive ratio than one yielding a small amount.

For the first part of the discussion, we will use the original German standard, which is not far out of the way for a thousand pound cow, yielding twenty pounds of milk daily, and later note how the ration should be modified as the amount of milk varies.

Clover hay has long been known as a first-class milk producing food, and 35 pounds of it contains 2.4 pounds of digestible protein and 13.9 pounds of digestible carbo-hydrates, or a total of 16.3 pounds digestible, while the standard mentioned above calls for 2.5

pounds of digestible protein and 13.4 pounds of digestible carbohydrates after reducing the .04 pounds of digestible fat to its equivalent in carbo-hydrates) or a total of 15.9 pounds digestible. So far, then, as the digestible part is concerned, the clover shows a close agreement with the standard, and if it was to be judged by the digestible alone, it would be called a good feed to be used by itself. Every dairyman knows that such a conclusion is wrong, and the error arises from considering the digestible part, without also taking into consideration the indigestible matter with which it is combined. The German standard calls for twenty-four pounds of total organic matter in the daily ration for the dairy cow, while some other proposed standards call for the same amount of total dry matter, and still others call for a slightly larger amount. The average practice of the best dairymen in the Eastern United States seems to be to feed such an amount of coarse fodder that the whole ration will contain about 4 pounds of "crude fibre," which is the indigestible part of the carbohydrates. This "crude fibre" of the chemist is principally the woody fibre of the plant, and its presence in greater or less extent constitutes the principal difference between the so-called coarse fodders and the concentrated grains. A hundred pounds of wheat straw contain about 38 pounds of this fibre, while the same weight of the grain of wheat contains less than two pounds. These two pounds of fibre are in the outer, brownish covering of the wheat, and in the process of milling go into the bran, leaving the flour free from fibre. Thus the various straws stand at one extreme as those richest in fibre, while the concentrated grains contain the least percentage of that material.

Returning now to the clover ration for the dairy cow, the 35 pounds of clover hay contain on the average 8.8 pounds of fibre, while the standard ration calls for only four pounds. These extra 4.8 pounds of fibre furnish the real reason why the clover hay is not a satisfactory feed to furnish the whole of the ration for the dairy cow.

The fibre in the food, i. e., the indigestible part, is what makes the food difficult to chew up and digest. The amount of labor performed by a dairy cow in grinding up and digesting her food is little realized by most dairymen. The time spent by the dairyman himself at the table is considered recreation instead of labor, but if he found on his plate a handful of cornmeal and a little pile of chopped hay, he would not have to chew long on those materials to realize that the eating of such foods is real hard work. But it is just as much work for the cow to chew the corn and hay as it would be for her owner. A man takes a ton of corn to the mill and gets it ground for a small sum. If he returned the next day with a ton of hay and asked to have it ground, he would be charged more than the value of the hay. It actually takes as much force to grind one pound of hay as twelve pounds of corn.

A horse plowing ten hours a day is thought to be doing a full day's work. A good horse will be able to do this work and keep up in flesh on about twelve pounds of oats and fifteen pounds of hay. He is supposed to be working ten hours a day, but in reality he is working fourteen hours a day, since the chewing and digesting of the twelve pounds of oats and the fifteen pounds of hay uses up as much muscular energy as is required by four hours of hard plowing.

Many people have claimed that the dairy cow must not be kept in the barn day after day, but must be let out so that she can get exercise. A good dairy cow in full flow of milk is always getting plenty of exercise. Even the most ardent advocate of exercise would admit that four hours daily of plowing would furnish a sufficiency of muscular exertion. But the cow is getting at least this much from the chewing and digesting of her food, when she is otherwise staying quietly in the barn.

It is the fibre in the food that necessitates the exertion of most of the force required in mastication and digestion. In the light of the foregoing remarks, we can now see why the extra 4.8 pounds of fibre in the clover decreases its value as a dairy feed. All of the force expended in the chewing and digesting of the food must come from the part of the food that is digested and assimilated. None of the force so used can serve for the production of flesh, milk, or butter. Therefore, from the store of nourishment derived from the digested food, the cow has to take out first enough to supply warmth to keep up the heat of the body; next, enough of all kinds of the material to repair the worn-out tissues and fluids of the body; then, enough force to do the work of the body, including the chewing and digesting of the food. If after all this is accomplished, there is still a surplus, this remainder can be used for production of flesh or milk. It is evident that every pound addition of the fibre decreases the net amount of digestible food available for production. The indigestible part of the food cannot be used for production of any kind, and its only use to the cow is to make bulk in the ration and distend the paunch, so that this organ may work properly in returning the food to the mouth for rechewing.

The problem before the feeder is, therefore, not to see how much fodder he can get his cows to eat, but how little they can consume and still keep up in health and have the paunch perform its proper functions.

Just how much labor is required to chew up and digest each pound of fibre has not yet been settled definitely. It is known that the amount is large and that it is well toward the food value of a pound of digestible material from the remainder of the ration. There will probably be no serious error if it is taken as the latter amount, i. e., that each pound of crude fibre in the ration uses up the value of one pound of the digestible material available for the production of milk. It is probable that this statement is a little too strong, and the above proportion will be used with the understanding that the resulting net food values obtained are probably a little lower than the truth.

Returning now to the clover ration for the dairy cow, the 35 pounds of clover contain 16.3 pounds of digestible material and 8.8 pounds of fibre. If the presence of each pound of fibre destroys the value of one pound of digestible material, then the 8.8 pounds subtracted from the 16.3 pounds, leaves only 7.5 pounds net of digestible material available for milk production and the needs of the animal body. The standard ration calls for 15.9 pounds of digestible, combined with only 4 pounds of fibre, or a net available of 11.9 pounds of digestible. Thus although the 35 pounds of clover hay has a slightly larger amount of digestible material than called for by the standard ration (16.3 pounds as compared with 15.9

pounds) yet so much of the value has to be used for chewing and digesting the fibre that the resulting net digestible is less than two-thirds the requirements of the animal, and, of course, under these conditions, the animal cannot do its best.

Dairymen have come to realize that timothy hay, as ordinarily made in Pennsylvania, is a pretty poor milk producer. A knowledge of its fibre compositions shows one of the reasons for this result. About 30 pounds of timothy hay per day is the most that a cow could eat and these 30 pounds would contain .08 pounds of digestible protein and 13.9 pounds of digestible carbohydrates or a total of 14.7 pounds digestible, which is not seriously below the 15.9 pounds digestible of the standard ration. But when the 8.5 pounds of fibre are subtracted from this 14.7 pounds digestible, there remain only 6.2 pounds net digestible as compared with the 11.9 digestible of the standard. So then a cow that has eaten all the timothy hay her paunch will hold has taken into her system only one-third as much protein as she needs, and only half the necessary total nourishment for full milk production. Corn stover shows closely agreeing figures. A cow can consume about 40 pounds daily, and these 40 pounds contain 0.7 pounds of digestible protein and 13.6 pounds digestible carbohydrates or a total of 14.3 pounds digestible, from which is to be subtracted 8.0 pounds of fibre, leaving only 6.3 pounds net digestible. The fibre content is the most striking difference between a dry corn fodder and silage. A hundred pounds of good silage contain .09 pounds digestible protein and 12.9 pounds digestible carbo-hydrates; a total of 13.8 pounds digestible. If the comparison stopped here, the dry fodder would seem superior to the silage, but when the fibre is taken into consideration, the conditions are reversed. The 100 pounds of silage contain only 4.9 pounds of fibre as against the 8.0 pounds in the dry fodder, leaving a net of 8.9 pounds digestible, almost a half more than in the dry fodder. Moreover, just here comes in another principle, which is best illustrated by pasture grass. All dairymen are agreed that if a cow has good pasturage she will produce a good flow of milk without addition of grain. It has been found that a cow will eat about 80 pounds daily of pasture grass, which will supply her system with 2.3 pounds digestible protein, 13.1 pounds digestible carbohydrates or a total of 15.4 pounds digestible. This is combined with 4.3 pounds of fibre, leaving a net digestible of 11.1 pounds. As compared with the standard, this ration of 80 pounds of pasture grass is a little low in protein, low in carbohydrates, more than the standard in fibre, and less total net digestible food, and yet experience has shown that the cow will make a larger milk production on this apparently scant ration of pasture grass than she will on a full ration of dry material. The explanation is to be found in the condition of the fibre. The fibre of the pasture grass in its green, soft, succulent state is more easily chewed and digested than after it has become dry and hard, so that the 4.3 pounds of fibre in the green grass do not subtract an equal amount from the total digestible, but only about half as much, leaving the net digestible considerably above the standard. Careful experiments have shown that the work of mastication is decidedly increased by allowing the green material to dry, sometimes even as much as 60 per cent. increase. It follows from this that a pound digestible in a green fodder has a higher value than a like amount in a dry fodder. Many years

ago, when studying the relative feeding value of dry corn fodder and silage, I found it to be a fact that the pound digestible in the silage produced more milk than a pound digestible in the dry fodder. At that time I could give no satisfactory explanation, but since the experiments were conducted on the work of mastication, the reason is evident.

So far we have given the analyses of coarse fodder with reference to their content of fibre. Now let us contrast this with some of the commonly used grains. Twenty-five pounds of bran contain 3.1 pounds digestible protein and 11.3 pounds digestible carbohydrates, a total of 14.4 pounds digestible—a little less than the standard. But these 25 pounds of bran contain only 2.2 pounds of fibre, leaving a net digestible of 12.2 pounds—a little above the standard. The 25 pounds of bran contain just about the right kind and amount of digestible material for a day's ration of a dairy cow, but the fibre is only half as much as the standard, i. e., a ration of bran alone would be seriously lacking in bulk—it is too concentrated to be fed alone. The analysis of corn shows how utterly unsuited this grain is to serve as the sole food of a dairy cow. A full day's ration of twenty-five pounds contains only 2.0 pounds of digestible protein—less than the needs of the cow—combined with 19.1 pounds of digestible carbohydrates—a half more than the standard—and only 0.6 pounds of fibre—an amount so small that the animal fed on corn alone could never ruminate. Cottonseed meal is equally one-sided; an equivalent quantity—25 pounds —contains 9.3 pounds of digestible protein—more than three times the needed amount—11.1 pounds digestible carbohydrates—less than the standard—combined with only 0.8 pounds of fibre—a fifth as much as the cow needs to do her best. A mixture of cornmeal and cottonseed meal could be made that would be just right so far as the protein and the carbohydrates are concerned, but such a mixture would always be lacking fibre to give it the necessary bulk.

There is a so-called "concentrated food" on the market at the present time whose analysis shows that it is not entitled to the designation. This is alfalfa meal, or ground alfalfa hay. It is sold for more than twenty dollars a ton, and the claim is made that it is equal in feeding value to bran. If the fibre is disregarded, this claim would seem to be justified. The alfalfa contains, in 100 pounds, 11.0 pounds digestible protein and 42.3 pounds digestible carbohydrates, or 53 pounds total digestible, while an equal weight of bran contains 12.2 pounds digestible protein, 45.3 pounds digestible carbohydrates—a total of 57 pounds digestible. If we stop here, the alfalfa seems almost equal to the bran, but when the fibre is taken into consideration, a very different complexion is given to the analysis. The 100 pounds of bran contains only 8 pounds of fibre, which subtracted from the 57 pounds of total digestible, leaves 49 pounds net digestible for milk production, while the 100 pounds of alfalfa contain 24 pounds of fibre, which taken from the 53 pounds of total digestible leaves only 29 pounds net digestible. In other words, bran at $40 a ton would be just as cheap as alfalfa meal at $24. Or, if bran can be purchased at $24 a ton, the alfalfa meal would have to sell for less than $15 to be as cheap.

The foregoing statements make it plain that the principal reason why grain is fed to dairy cows is for the purpose of reducing the

amount of fibre in the ration. The standard ration calls for about 16 pounds of digestible material and 4 pounds of fibre. Materials that contain a larger proportion of fibre are called coarse fodders and those with a smaller content are known as concentrated feeds. The standard ration contains 25 pounds of fibre for each 100 pounds digestible and the following table shows the relative amounts in some of the common dairy foods:

	Total digestible pounds.	Fibre pounds.
Standard ration,	100	25
Oat straw,	100	82
Timothy hay,	100	58
Corn stover,	100	56
Clover hay,	100	54
Alfalfa hay,	100	44
Silage,	100	43
Pasture grass,	100	28
Bran,	100	15
Oats,	100	14
Cottonseed meal	100	7
Corn,	100	3

The problem of the feeder is to make such a mixture of materials, rich and poor in fibre, that the resulting ration, while containing the proper kind and amount of digestible ingredients, shall also contain one-fourth as much fibre.

Since the coarse fodders raised on the farm have an excess of fibre and are low in digestible protein, and since grain is bought for the purpose of obtaining the needed protein, and because it is low in fibre, it follows that in buying grain it is the part of wisdom to buy those grains that are lowest in fibre and highest in protein; fewer pounds will have to be bought to balance the coarse fodders raised on the farm. Just here is the strong argument against the "molasses feeds" now on the market. In general these are composed of a mixture of some concentrated grain, like linseed meal, and some waste product, like oat hulls, with enough of low grade molasses to make the mixture palatable. The molasses in itself is a good feed, but it has no more value than an equal weight of cornmeal and is lacking in protein. The presence of the oat hulls or other refuse makes the mixture high in fibre so that the molasses feed fails to satisfy each of the purposes for which a grain is purchased.

A common practice among dairymen needs here to be mentioned; many farmers feed liberally of grain and good coarse fodders morning and evening, and then at noon throw into the manger a forkful of oat straw or some other hard, woody substance. They think the more they can get the cow to eat of such material, the more the profit. Oat straw is fairly well digested by the cow, but look at its content of fibre. When the cow has labored vigorously for half a month, and has succeeded in worrying down 100 pounds of oat straw, what has she gained? The 100 pounds of oat straw contain 42 pounds total digestible, but they also contain 37 pounds of fibre that has to be chewed, digested and gotten rid of, using up all but five pounds of the food value obtained from the digestible part.

So the dairyman has been asking his cow to do a large amount of extra work, for which she can return little or nothing in extra milk flow. It is the same principle as if he drove her a couple of miles each day along the highway for the sake of the few mouthfuls of grass she might snatch from the roadside. Instead of taking this extra amount of fibre into the system, it would be better to allow the cow to rest and ruminate through the middle of he day, and put her energies night and morning into the chewing and digesting of material rich in net food value.

The standard ration used in the previous discussion, furnishes 25 pounds digestible protein, 13.4 pounds digestible carbohydrates and 4 pounds of fibre, contained in about 24 pounds of total dry matter. This is a fair ration for a 1,000 pound cow, yielding about 20 pounds of milk daily. Some late investigators have undertaken to vary the standard according to the quantity of milk produced. The best known are the standards of Dr. Kahmann, which are given below:

Daily ration for a milch cow when yielding daily.	Total dry matter. Pounds.	Digestible protein. Pounds.	Digestible carbohydrates. Pounds.	Total digestible pounds.
11.0 lbs. milk,	25	1.6	10.7	12.3
16.6 lbs. milk,	27	2.0	12.0	14.0
22.0 lbs. milk,	29	2.5	13.2	15.7
27.5 lbs. milk,	32	3.3	14.9	18.2

It will be noted that all the different ingredients of the ration increase as the amount of milk produced increases, but the increase is in very different proportions. As the protein doubles, the carbohydrates increase less than a half and the total dry matter adds less than a third. It will be seen that the increase in digestible material amounts for nearly all of the increase in dry matter, or in other words, this experimentor believes that the cow giving a small flow of milk requires the full four pounds of fibre per day to distend her paunch, and that this amount should not be increased, no matter how heavily the cow is fed. This means that in heavy feeding, the extra feed should consist almost entirely of concentrated grain. The above remarks apply to cows of 1,000 pounds weight. If the cow is larger, the amount of fibre per day should be proportionately increased, and it should be correspondingly diminished for the smaller cow. The 1,500 pound cow would receive 6 pounds of fibre per day and the 750 pound cow only 3 pounds.

The conclusion of the whole matter is that the successful dairyman will strive to have the ration of his cow as concentrated as possible, consistent with their health.

A Member: Professor, is it not a fact that corn stover is not given credit for all it is worth, because in the analysis the leaves are not given full credit?

PROF. COOKE: I see the difficulty is with you, not with the system. You imply that you think the leaves of the corn are superior to the stalk in food value, but I don't think you are right. I have

been advocating the silo, and one of the advantages of that is that it enables you to feed all of the corn stalks. Now, if you could cut it off nearer the surface of the ground and see what it would do, you would see what I mean. A man said to me, "Why, I would not insult my cows by asking them to eat the butts of the corn stalks," so I determined to investigate the matter thoroughly. I took the corn stalks, and stripped the leaves and tops off them, and put these in one bunch, and then I made another bunch of the butts. Now, the cows were divided and one-half fed on the tops and leaves, and the other half on the butts. They were changed around every month, until we had three distinct sets of analysis, and in every case the cows fed on the butts gave more milk and were better fed than those fed on the leaves and tops.

A Member: Professor, what do you mean by corn stover?

PROF. COOKE: In this case it represents the corn stalk after the corn has been taken off. And yet it would be very little different if what is called "corn fodder" had the entire plant cut off.

A Member: How about buckwheat? Any food value in that?

PROF. COOKE: Well, yes; there is some; it has a trifle higher value than oat straw; it would keep her from starving to death, but that is about all.

MR. McCLELLAN: How about wheat straw?

PROF. COOKE: Well, I like it better outside the cow rather than inside of her.

MR. HUTCHISON: You mean simly for bedding?

PROF. COOKE: Yes; I like it around the outside of the cow best.

A Member: Do you think it is profitable to buy oat hulls, which have 4 per cent. of fibre, and mix them with the other feed? Is it needed as a filler?

PROF. COOKE: Well, a cow must have some filler, but you can raise that filler more cheaply on the farm. If you have nothing else she can use oat straw and hay. We cannot afford to buy the filler. I do not say anything about molasses feed. There is a great deal of this sold on the market at the present time. As I said before, it is totally lacking in protein, and you buy it and lose in food value.

SECRETARY MARTIN: Would you feel safe in advising the farmers not to buy any fibre?

PROF. COOKE: Buy just as little fibre as possible. Everything you raise on the farm has fibre. The standard calls for ¼ fibre; anything above that is coarse fodder, and anything below, concentrates. When you buy, buy low in fibre and high in protein.

A Member: It is hardly justifiable to buy the oat hulls from the cereal factory, is it?

PROF. COOKE: No; you are not getting anything for it,

A Member: A cow gives 14 pounds of milk per day; would it be advisable to buy cornmeal at the same price as gluten meal, or linseed meal, or whole grain at the same price?

PROF. COOKE: Well, it depends upon your hay. If your grass products are high in protein, get fibre and if they are low in protein buy the gluten.

DR. DETRICH: It means a difference in the value of the manure.

PROF. COOKE: Certainly; and every pound of protein you get adds to the value of the manure.

A Member: Would it be advisable to buy feed adulterated with ground corn cobs as a lightener?

PROF: COOKE. You raise it one the farm, and get it for nothing, so you can hardly afford to buy it. Every pound of corncobs you buy, is just that much money thrown away.

SECRETARY MARTIN: At the earnest solicitation of thousands of farmers of Pennsylvania, we made a strenuous effort to secure the presence of a gentleman who has accomplished more in the way of improvement of the dirt roads of the United States than any other man, and this gentleman has just come into the hall. I know you are all anxious to welcome him, and to listen to him for about five minutes as a prelude to what is to follow tonight. I am pleased to introduce to you Mr. D. Ward King, the great road drag authority of the country.

MR. KING: Mr. Chairman, Ladies and Gentlemen: Mr. Martin laid very unequivocal emphasis on the "five minutes," so I will talk to you with my watch in my hands.

I will not attempt to say anything to you at this time. If your roads throughout the State are like those of Dauphin and Cumberland counties, they will not need much attention.

I want to say one thing to you about the meeting tonight; don't insist upon people coming to the meeting tonight. You expect peculiar things from the West, and I mean exactly what I say. If you insist upon people going to a particular meeting at any time, they will most likely have some duty that must be attended to at just that time. Why, if I stopped a man on the road near my home, and offered him a silver dollar, he would stop and look at it, and most likely go on, thinking there was something wrong with it. But if I were to throw that silver dollar into the mud, and then stay some little distance away, you would see him get off his wagon, and dig into the mud for that dollar. The same thing applies to the meeting tonight. Don't ask any one to come; they will be sure then to want to come. Don't take any interest in the meeting, but if any one asks you whether I am here, tell them you understand I am. They'll come out of curiosity, if you don't insist on it.

Now, I shall not say anything more until this evening. My five minutes are about up.

The CHAIRMAN: We will now take up the next number on the program: "Horse Breeding for the Pennsylvania Farmer," by Prof. T. I. Mairs, of State College.

Prof. Mairs spoke as follows:

HORSE BREEDING FOR PENNSYLVANIA FARMERS.

By PROF. THOS. I. MAIRS, State College, Pa.

The object of these talks, as I understand it, is to exchange ideas and present to each other what we believe should be presented to the farmers of the State. With this idea in mind I say what I do concerning the production of horses in Pennsylvania.

The horse is an animal of universal interest, one which cannot be dispensed with by persons in any class of agriculture. The stockman, the dairyman, the trucker, and the gardener as well as the general farmer all have uses for horses. Moreover, the horse is not only used on all farms, but large number are used in the cities which must be produced on the farms. There has been, within the last few years particularly, a rather spirited discussion as to whether we are coming to a horseless age. I do not propose to take part in this discussion so far as the future is concerned, but I believe it can be clearly shown that up to the present time, if we are approaching a horseless age, our progress has been decidedly slow. There is no doubt that the growth of the motor car business has been remarkable in the last five or six years, but the best statistics available indicate that the horse has not suffered appreciably from it. In 1903 there were in the United States approximately 16,000,000 horses, valued at $62 per head, in 1908 there were 20,000,000, valued at $93 per head, an increase of 2 per cent. in numbers and 50 per cent. in value. In Pennsylvania in 1903 there were 678,000 horses valued at $81 per head. In 1908 607,000, valued at $114 per head, again a decided increase in valuation and a slight increase in numbers. These figures, I believe, show conclusively that the horseless age is yet some years in the future. It is only in a few instances as in some delivery wagons, trucks, etc., that the horse has been displaced by the motor. In most cases those who keep motor cars either keep them in addition to the horses which they formerly kept or would not keep horses even if the automobile were not available. A large majority of the horses kept in Pennsylvania are produced outside the state. There were in Pennsylvania, according to the census of 1900, 30,619 horses and mules under one year old and 976,119 over two years' old. If we assume the average period of usefulness to be ten years, which would mean that the average age of a horse at the time of its death was twelve years, we find that only about one-fourth enough colts are raised to supply the demand for horses and mules in the state. Our contention is that the Pennsylvania farmers can produce their own horses cheaper than they

can buy them and not only can they produce horses for their own use, but can produce at a profit a surplus for the cities. It is impossible to get records of all animals shipped into Pennsylvania, but the receipts of horses at Philadelphia in 1908 were 15,198, the shipments 8,546. Showing that if this is to be taken as an average year that Philadelphia uses up each year 6,652 horses. This is assuming that none of the horses shipped out were broken down horses taken to the farm. Allentown, which is undoubtedly an agricultural community, received 4,500 horses and shipped out 2,600, leaving 1,900 horses bought in that immediate neighborhood for use in that year.

Most of the horses shipped into Pennsylvania come from west of the Missouri River. Some are produced in Missouri, Illinois and Iowa, but the majority probably are bred farther west and are brought to Missouri, Iowa and Illinois as two or three year olds, are kept there a year or two, broken, fattened, sent to the East St. Louis or Chicago market and then come further east as Illinois or Indiana horses. There is no reason why they should be called Illinois or Indiana horses rather than Montana or Wyoming horses further than the prejudice against the cayuse or broncho. In fact the probabilities are that the horses coming from west of the Missouri River are actually better than those coming from east of the Mississippi River. They have been graded up from the broncho stock by the use of stallions of the draft breeds. They have been subjected to more harsh treatment, the weaker ones have been dropped by the wayside and only the stronger survived. Furthermore the soil and climatic conditions have been such as to develop toughness of foot, hardness of bone and hardiness of constitution.

We believe that Pennsylvania has the soil, climate and water for producing better horses than can be produced in the prairies of the West. We believe that naturally the Pennsylvania horses have better feet and legs and are more able to stand the pounding on the hard roads and the climbing of hills than are western horses. Further, it is well-known that a western horse shipped into Pennsylvania is of very little use for six months to a year after shipment. It is true that some shippers use a serum which it is claimed renders the horses immune from acclimatization fever, but the general opinion among farmers and others is that a considerable period of uselessness results in any case.

The western horses shipped into this State four, five or six years old sell anywhere from $200 to $250. Our contention is that our farmers can raise as good or better horses for less money. The horse on the farm ought to be able to pay for his keep after he is two years old. His dam will more than pay the way of herself and foal during the suckling period, so that there should be charged against the horse only the service fee, cost of keeping until he is two years old, plus a certain amount for insurance and risk.

The Pennsylvania farmer can well do most of his farm work with brood mares. It will do them no injury if carefully handled and he will be able to get practically as much service from them as from geldings or from mares that are not used for breeding purposes. It costs little if any more to raise a colt than it does to raise a calf. As a two-year old, one is worth twice as much as the other. One hundred dollars ought to be ample to bring the colt to two years

of age and show a profit after which time he should be self-sustaining. This applies to animals or colts used for farm or draft purposes rather than those that are used for pleasure.

We do not believe it wise to encourage the average farmer to engage in the production of pleasure horses as a business. This would better be left to specialists and to wealthy men who can afford to charge up part of the cost to recreation.

As to the breed which the farmer should select, I would say select whatever one he can sell best in his neighborhood and to which his farm and methods of farming are adapted. All of the draft breeds have their advocates and undoubtedly all have their good qualities. For the average grain farm or comparatively level land some breed of this type would be best. In some cases on rough farms coach horses and horses of a general purpose type would be better. One disadvantage here is that if marketable animals are not obtained, those left on the farmer's hands are of much less use than if they were more nearly of the draft type. Whatever breed is selected he should stick to that one, but especially should he stick to that type or class. The man who attempts to get the good qualities of two or more breeds and eliminate the bad ones by crossing is almost sure to do exactly the opposite. The reason is very simple: the good qualities are more artificial and have been secured by careful and rigid selection, the bad ones are more common and have generally been inherited from a longer line of ancestry. Since crossing tends toward variation and since variation tends toward the mean of the race there is produced those average qualities which do not fit the animal for any particular purpose. This is exhibited most strongly when cross bred animals are used for breeding purposes.

The first thing which the farmer and future horse breeder must select is his brood mares. These should be selected primarily from the standpoint of their being able to do the work required of them. It would be a mistake to select heavy draft mares for some of the rough hill or mountain farms and a greater mistake to try to do the work on comparatively level farms with light mares. Horse power is cheaper than man power.

Maternity rather than beauty should also be kept in view. The best looking mare is seldom the best breeder. The brood mare should have a roomy somewhat loose construction rather than the compact closely knit form which is more attractive to the eye. It is a general rule of breeding that campactness should be sought in the male, size in the female. A partial exception to this rule is in the production of draft horses on the farm. Excessively heavy mares would be unwieldy for general farm work; therefore size is sought in the stallion, and mares are chosen which are not too large to be profitable workers, but large enough to mate consistently with the stallion selected. If the stallion is very much larger than the mares the cross becomes too violent.

None but pure bred stallions should be patronized. The grade stallions should be put out of business. It is not that there are no grade stallions that are good individuals, but according to the laws of heredity and probability it is impossible for the grade stallion to produce as large a proportion of colts of the desired type as the pure bred one. On the other hand, in the majority of cases it is more profitable to use grade females for breeding purposes than

pure bred ones. The investment is much less, consequently there is less risk. The grade animals are just as good workers as the pure bred ones, and unless one is producing breeding stock, the progeny will sell about as well.

It is impossible to be too careful in choosing a stallion. A few dollars in service fee should never stand in the way of patronizing a good stallion. It may mean several dollars on the value of the colt later. Two stallions, one at $10 and one at $20, from the ten dollar stallion you may get a colt worth a hundred dollars as a two-year old and from the twenty dollar stallion one worth a hundred and fifty dollars, it costs the same to raise each. Which is the cheaper?

Look out for transmissible defects, faults of conformation, quality, function or disposition. It is not always that the higher priced horse is the best, but if he is, he should be patronized, there will always be plenty of people willing to patronize the low priced one.

There are advantages in the company horse if he is a good one and bought right, but most of them seem to have cost more than they could have been sold for in any other way. Many of them seem to have drunk too heartily also. The cost is not the same to the different shareholders. Sometimes a few shares are distributed for influence and prestige.

The stallion that is worked regularly will generally be a better animal than the one that stands in a box stall. A much better opinion can be formed of his ability, constitution, disposition, etc.

In some cases it may be desirable to raise spring colts in others fall colts. A great deal will depend upon local conditions as to which will be more desirable. Both seasons have their advantages. One advantage of the fall colt is that it is being suckled during the season when the mare is less worked than at any other time of the year and it will be weaned about the time grass is ready, so that the change will probably not be so radical as if it were weaned in the fall and put at once on dry feed. Another advantage is that it will be about the right age for handling, breaking, or training to work in the fall of the year and may be worked lightly during the winter and put at somewhat heavier work in the spring and there is a possibility that it may be brought to maturity at a little less cost than the spring colt.

The advantages of the spring foal are that this is a natural breeding season, the foals are usually stronger, they can spend a greater proportion of their early life out doors and will be less trouble than the fall colts. In any case colts should not be allowed to run with the mares when at work. In the fall they may be left in box stalls. If spring colts, they should be left in the yard or paddock, preferably a grass plot and allowed to be with the mares only when the latter are brought in for feeding during the day. This will be no hardship to the colt, there will be less risk of its being injured, and more work will be gotten out of the mare because she will not fret and the colt will not be in the way on the fields.

A Member: Do you think it is better to work mares up to the time they are foaled?

PROF. MAIRS: Oh, yes, up to within a day or two, if they are worked judiciously. It is better for the mare, and better for the colt to have the exercise.

MR. HOOVER: I have listened to the Professor with interest. In my earlier years I raised a great many colts, and I can endorse what he says. I always made it a rule to work the mare up to within a week of her foaling, and then give her a few days' rest. Another thing to be observed is the feeding of both the colt and the mare, for it may affect both. Give them plenty of exercise and fresh air, and keep them dry and warm. Treat the mare kindly, so as to give her a good disposition, for the good disposition is inherited. In draft horses you want to look for muscle, bone and size. In the medium horse, we should look for what we call a "general purpose horse;" if you look for a racer, you want light weight, light muscle, and light bone. The English hackney crossed on the French Coach horse makes an excellent medium horse.

SECRETARY MARTIN: As has just been said, we have listened with interest to this very fine address, and I have no doubt there are many questions in your minds. we can devote four or five minutes to them after listening to Dr. Hunt for a few minutes. We will adjourn at ten minutes of twelve, in order to open our session at one o'clock in order that we may all take in the excursion to York Haven this afternoon.

A Member: Professor, what is the proper food and amount for a colt?

PROF. MAIRS: Hay and corn; the quantity of hay should not be too large, and the quantity of corn large enough to eat it all up and ask for more.

MR. HULL: Does it pay to keep the dam and the colt in milk all winter?

PROF. MAIRS: I don't know; you have got to produce that milk.

MR. HULL: My experience has been that it is cheaper to keep her in milk during summer; so long as the colt does not shed, he is not capable of eating.

SECRETARY MARTIN: Dr. Hunt will now address us for a few minutes.

DR. HUNT: I have no address to make, but I want to ask one or two questions of Prof. Cooke, on that most excellent address, but I cannot resist making a point or two about horses, because horses are my weakness.

Some weeks ago I met the man in charge of the delivery wagons of one of New York's big Department Stores, and I asked him how many one and two-horse teams they use, and he told me how many horses they use, how many automobiles, how many gasoline vehicles, and so on. The point was this: that there is nothing in the automobile for delivery purposes, except as an advertisement, and, in general, he said that the large stores would not use them for delivery purposes, except for that fact; but that they are now becoming so common, that they no longer serve for that purpose to the

same extent that they did several years ago, and they are gradually going back to horses. And just the other day I happened to read in one of the papers the following article:

"Going Back to the Horse.

New York Department Stores Find Auto Wagon Expensive.".

For several weeks past the representative of a big firm of New York horse dealers has been in the Middle West selecting good horses suitable for delivery work, says the *Western Horseman.* The order calls for 840 horses, and the agent states he has traveled over a large amount of ground and has not yet been able to complete the order. The horses that he has selected in Indiana are of a high type of work horse, and he pays good prices for them. These horses are being selected on an order from several of the largest department stores in New York, which sometime ago gave up their horse vehicles and substituted the automobiles. Now the automobiles are to be discarded as soon as the horses can be procured.

This is due to the fact that the managers of the delivery departments of these two big stores have found that automobiles are not only more expensive to maintain, but that they have lost the advertising power they had when that service was inaugurated. There was a time when the automobile was a novelty, and when the New Yorkers would "sit up and take notice" when an auto delivery wagon appeared on the streets. Now no more attention is paid to them than to the street cars. On the other hand, a fine pair of horses always attract attention. No matter how many horse-drawn wagons there are on the streets, the sight of a nice team, well-appointed, never ceases to command admiration, and any kind of a team has it over the automobile. The big store managers never forget the advertising side of any feature, and when it is also demonstrated that the horse-drawn delivery wagons are cheaper to maintain, there was no hesitation in discarding the expensive pieces of machinery and purchasing new wagons and new horses.

Now, the point I want to make is this: that as long as men are going to buy horses, they are going to buy good horses, and just as long as they do this we are by no means approaching the horseless age.

Now, to come to Prof. Cooke's address. I want to emphasise what he said about the straw on the outside of the cow. Up at our Experiment Station, where probably the most thorough experiments along this line in the world have been conducted, Dr. Armsby has shown that when a steer is lying down he saves one-third more energy than when he is standing up. Prof. Cooke has shown you that the gain from roughage in this form is so small that it strikes me that it will serve a better purpose in the form of a bed on which the cow can lie down and save this one-third of her energy. Dr. Armsby carried on his experiment further; he put one-half of his animals outdoors, and the other half indoors, and the results were the same if he kept them dry and had a good place for them to lie down, because the heat which the animal produced in masticating his food, necessarily kept him warm.

Now, I would like to ask Prof. Cooke, whether in keeping a cow for maintenance alone, not to produce milk, it would not be just as

well to feed her on straw alone, because that straw produces heat? What I want to bring out is this: if the straw has a great deal more value as bedding when the cow is well fed, if she is kept for maintenance alone, would it not be cheaper to feed it to her to keep her warm?

The other is whether the crude fibre in the bran may not be a poorer fibre than that in the alfalfa? They come from such widely different strains, and while there appears to be a great difference in favor of the bran, is that a fact when you take into consideration the source of the crude fibre? Understand, I am not criticising; I am raising a question and arguing it.

PROF. COOKE: I don't think that experiments have been made which will answer Dr. Hunt's question, showing the difference in the crude fibre from the grain, as against that of the coarse fodders. I should rather think this would be the other way, but I don't think there would be much difference between the two.

In the other instance Dr. Hunt is exactly right. In my talk this morning I simply emphasized the amount of work entering into the production of heat; but when that cow is not producing any milk, the fibre alone will serve to keep up the animal heat of the system.

SECRETARY MARTIN: It will now be necessary for us to adjourn in order that we may get back here at one o'clock.

The CHAIRMAN: The meeting stands adjourned until one o'clock. Kindly note the change in the hour and try to get here at that time.

Thursday, May 27, 1909, 1 P. M.

Mr. Dorsett in the Chair.

The CHAIRMAN: The meeting will please come to order. The program is going to be varied somewhat this afternoon. I noticed yesterday afternoon that our honored Secretary, and Brother Hutchison, and Brother Herr, and some of the rest of the boys were indulging in a nap. Now, there will be none of that this afternoon; everybody will have to keep wide-awake. We are going to change the program every five minutes. This is the new era in Institute work, and you fellows will have to keep up with it. The first question is "At what stage in life is the proper time for the Institute lecturer to be relieved from the work?" I will refer that question to my young friend, Mr. Young, of Columbia county.

MR. YOUNG: The proper time to lay the Institute worker aside is when he is worked out, not when he is done. I don't propose to quit farming until I can't do any more work. As long as a man can do good work, he should be kept on. The longer he is kept in the work, the better he should grow until the infirmities of age lay him aside. Don't lay him aside until you get a better one. It strikes me that our older Institute workers are our better ones. The longer they work, the better work they do. I would say, continue them until they are worked out.

The CHAIRMAN: That is first-rate. Some one has said, "Be not the first to lay aside the old, and take up for the new," and I suppose that will apply also to Institute workers. Now, has any one else anything to say on the subject? Here is my friend from Lackawanna, Mr. Northup. We would like to hear from him.

MR. NORTHUP: What is the time the Institute worker should be relieved from the work—that is a question that is very applicable to me. It has been in my mind for some time, and I often think that I may be like the farmer of Brother Seeds' story, whose horses were afflicted with distemper, and he filled his pockets with asafetida, and his wife called the children together, and told them that their father was dead, and didn't know it. Now, the Institute lecturer may be dead, and not be aware of it. Now, I want to say that this feature of retirement is being pressed by my wife. When I started out the other day she asked "How long is this running about to Farmers' Institutes going to continue?" She said, "If you are going to continue it, you had better get your hair dyed so that you can look as young as possible." Now, that might be all right, but I would not like to do it. I don't think I will have to do it to keep up with the work of the Farmers' Institute; I love the Institute, and I love the work; I don't think there is any man except perhaps Brother Seeds who loves and enjoys the Farmers' Institutes more than I do. I love the farmer, I love the association of farmers, and I love the Institute. I love my family and I love my farm as well as any one, and it is not always pleasant to be away, and I tell the young fellows every time that I am going to retire, but they say "you are good for a number of years yet." I don't say they are in earnest; they may be just making fun of me, and it bothers me. Another thing: you will find it among the doctors, and among the preachers, and among the lawyers, and in every other profession; sometimes the younger fellows are just waiting to step into the old man's place; they want him to retire, so as to give them a chance to get in their work. Now, I want to say to you young fellows, whenever you see any indications in me that I am losing my mind, I want you to tell me. Now, I believe that if a man wants to live long and keep young, there is no better way than by keeping at work, and doing something for his kind. He will keep his spirit and his body active. Some of us old fellows are like the old cow in the herd, who strains every nerve to keep up with the rest; when we have to do that, it is time for us to retire, but so long as we can keep up, we should be allowed to do so.

The CHAIRMAN: Any one else want to talk on this subject for two minutes?

MR. FERGUSON: I want to say that the old men, so full of spirit and enthusiasm are an inspiration to the younger men just starting out in the work. I appreciate them.

MR. BOND: My memory carries me back twenty-five years ago, when I first made my appearance before a Farmers' Institute, when my friend Northup and I were associated together, and when I recall the teachings I presented then, it is a question with me whether it would not have been better to have retired me before I commenced.

The CHAIRMAN: I think from the remarks that have been made, this is the situation: Some great man has said that when a man becomes satisfied with himself, with his achievement, that is a sign that he is "dying at the top," and ready for the undertaker. Now it appears from the remarks that have been made that our Institute workers are still willing to grow, and as long as they are, there is no necessity of retiring them.

The next question is "What is the best way to introduce a woman's session into every two-days' institute?"

Now, I really don't know which one of the chairmen thinks most of the ladies: I think I will call on Brother Herr.

MR. HERR: I once listened to an old preacher, whom we called "Scotchy Campbell" tell about "that jewel, a fine girl"; he said: I have raised five boys, but I never raised a girl, therefore I know all about them." I suppose that is the standpoint I am to talk from. In my own county I have never had a womans' session. I believe that in some sections of the country it is all right, but in others it does not do so well. In some sections, the women are accustomed to public speaking, and enter heartily into the whole thing, but over in my section, for instance, they are backward, and it is difficult to get them to come forward. Now, I believe in the practical part of institute work, and if our speakers will give us something that will be of benefit, that is all right, but if it is merely an entertainment, they might just as well call it an entertainment as an institute. If we can find sufficient ladies to give us practical instruction, that is all right. In the whole northern tier of counties, the women are qualified to take an active part, and in the southeastern part, among the Quakers, you will find some ready speakers, but in my section of the State, they are not yet ready for the movement.

MR. HUTCHISON: Some of the gentlemen present can testify as to the interest which the ladies in my own town take in the Farmers' Institute. Now I have been a practical farmer for many years, but I think on the whole, Mrs. Hutchison is a better farmer than I am. Now, I turned over to her the Ladies Session, and she made one condition—that I keep my mouth shut. And you should have been present at that session. It was by far the best of the whole institute. Those women started in and took up questions that concerned the home; then they took up the school question, and they threshed out those school directors as the men did not dare to do, with the result that they got the reforms they asked for; those men were afraid not to grant them. Then they took up the machinery question on the farm, and the improvements of the house —the water being brought into the house, and so on. Why, they had a three hours' session, with sometimes a little music or a recitation to relieve the monotony. You can't talk at Farmers' Institutes all the time about the practical part; you want a little recreation as well. Why, these ladies took up everything that pertains to the home life, and if we get the women interested in the Institute, we will have a better home life, and better homes. I think you will find that if you once get them interested, they will take hold of the thing and make a better one out of it than you could yourself.

MR. HOLMAN: I desire to say that we have held Ladies' Sessions very successfully, and they have been just as beneficial as Mr. Hutchison has said. The only tronble is that it makes a whole lot of work for the chairman. Now, if all the chairmen were bachelors like our friend Herr, it might not be so hard to get the ladies interested, but it does mean a lot of work for the married men, although it pays for itself.

MISS THOMAS: I want to say that I am in the Institute work because of my interest in the work, and because of the opportunity it affords to interest the county chairman in the work of a practical basis. I feel that the State owes just as great a debt to the women of the State, as to the men, and I trust that the day will soon come when the Agricultural Department will send out instructors that will make us better women, better wives, better farmers' wives. We need to magnify our work; we need to look outside of our homes, so I would ask the County Chairman to kindly grant to the yomen a Ladies' Session with every two-days' Institute.

MR. SEXTON: I am pleased to have the opportunity to listen to one of the lady representatives from Montgomery, for the reason that in our county some years ago, I tried very hard to get the ladies to take part in our institute work. We commenced by asking some of the ladies to read papers at our institutes; they were timid at first, and it was some years before we succeeded in getting them fully interested. You see the result. This young lady only four years ago started in the work. We knew she could do some good work, and we pressed her to come in with us. Some years ago we induced several of the Quaker ladies to take hold, and now it seems as if we cannot hold an institute without a Ladies' Session. Sometimes we get into a new district where the women are still backward, but we try to get them to read papers, and it is not long before they are ready to get up and speak whether they have a paper or not, and our most crowded sessions are those at which the ladies have charge. So I think we should always get the ladies to help us both along the lines of farm work and home work.

MR. BLACK: The great trouble is that we made the mistake in starting. We should have included the ladies in the start. Now, it will mean a little hard work, but no harder than it was at first to get the male population in. Any work must be for both sides of the house to make a success, and I think it is the best move we can make to have a ladies' session at all our meetings.

MRS. ZIEGLER: I want to say that I think one of the best ways to get the ladies interested is for the chairman to appoint a lady on the local committee. She usually knows the ladies of her community, and she can get them to read a paper. She can sound these ladies, and give them a memorandum. I have known cases where ladies would be assigned a subject, and given a little outline, and they would develop an interest and become good workers.

Now, I want to heartily endorse what Miss Thomas has said. I think the women of the State are entitled to the work. You all know how the men have been helped, and the women need the same

help with the home, and encouragement in the care of the children and the home. There are many little trials and crosses in a woman's life that a man knows nothing about. No greater work can they do than to bring up the children so that they will be capable, honorable men and women. Let some of the non-essentials go. The first year I was in the work, I did not feel the need of this work among women as I do now, since I have had them in their daily life of teaching the children the doctrine of cheer and helpfulness and kindness in the home. Now, we know that the home is important—it must be, or the head of our government, would not have undertaken to do what he did, and while he was widely criticised, we must give Mr. Roosevelt the credit of being sincere in his efforts to uplift the home.

MR. STEPHENS: Now, I am not a farmer, but I have been among the farmers most of the time for the last three years by choice—usually in a different home each year, and I know there is need of good women in the homes to keep the boys and girls there. The boys and girls usually go into town because the work is heavy, and the life lonely upon the farm. I believe that every county chairman or his wife should see that the home is given a prominent place on the program. In every county where there is a two-days' institute, let the county chairman select some good woman and let her find people who can be definitely depended upon. It is not the polished people you want, but the people from roundabout who can tell what they have done for the home. I believe in having one speaker who is competent to teach, but I believe thoroughly in having the women from the representative homes in the county show what can be done.

MR. BRODHEAD: I have had some experience in institute work in Pennsylvania and adjacent states along the line of womens' institute work, and from my observations I can say that wherever there is a discussion along the lines of womens' interests, you can always depend on an interesting discussion. I think it will be for the best interests of Pennsylvania not to eliminate the Ladies' Session, but to hold it wherever possible to have it. I think it will elevate the work. It gives us men a higher inspiration to hear our wives and daughters discuss the questions of the homes.

DR. CONARD: Now, I think the program should be divided up into a special session for the men, and a special session for the women, and then a general session, of interest to both. There are always subjects that interest the men, which are of little interest to the women, and many of the subjects that interest the women have no interest for the men, but there are subjects of mutual interest to them. Why not have a special session in which the men can discuss the technical questions which interest them, and let the ladies have a special session to discuss their technical subjects, and then have a joint session for the subjects that interest both? I attended an institute in our county conducted in this way, and found it very interesting. Get the women interested in home hygiene and decoration. It will result in great improvements.

MISS THOMAS: May I have one more word. I would suggest that instead of having the ladies write papers, you get them to

speak; they can talk without a paper if you get some subject in which they are interested. I would suggest, also, that you have a woman as chairman; get some representative women of the county or community interested, and you will have a successful women's meeting.

PROF. MENGES: Mr. Chairman, a little while ago we legislated for the old cow. You know they got afraid that the oleomargerine would put the cow out of business, so we began to legislate for her, and it is right that we should, for many of us live by the cow, but the time has also come when we should legislate for the babies and for the home. We have passed pure food laws in our State; the government has passed such a law. We are required to know something about it, but the pure food laws pertain more to the women and to the home than they do to us men. They mean a great deal more in the home than out on the farm. We have fertilizer laws, and feed laws that protect our cattle, but when it comes down to the babies in the home, there are some of you old fellows who sit here and look at me, who do not care a continental what your babies are fed. I am sorry to say that. You know I had some of these fellows with me where we had ladies' sessions, and from what we heard, I think it would be wise to follow the example of the little girl. A little boy and girl were playing out in the meadow, when a goat came up; Susie said to Johnny, "Can you pray?" Johnny said, "No; you pray." So Susie prayed, "Oh, Lord, prepare us for what we are about to receive!" Now I want to say that some of these old fellows had better say that, for they get it mighty hard. Now, I was in a certain county not two hundred miles away from here, and they told me that it was hard to get the men to the institutes where they had a Ladies' Session. They were Pennsylvania Dutchmen, you see. I went round to see one of them, and said to him, "Why don't you come?" He said, " I was there once, and those women talked about things they had no business to talk about." I didn't ask him what, because I knew pretty well. Now, I am one of the strongest advocates of the Ladies' Session, and I think the institute that has none, is considerably out of it.

The CHAIRMAN: Any questions which may bring out some more views? I might say that possibly one reason why we do not have more ladies in our work is because some of the county chairmen and possibly our good director himself, are like the preacher who tried to prove that there were no women in heaven, and the women had an interview with him, and demanded his authority. He said he found it in Revelation 8-1: "And there was silence in heaven for the space of about half an hour."

I might say that I do not take that passage literally, nor do I believe in the doctrine of St. Paul, that women should keep silent. I believe that some of the best things the world ever saw, were introduced by women, and would never have been originated except for the women. We have a Womans' Session in Tioga county, and are glad that we have.

SECRETARY MARTIN: Now, my friends, you know that I am a very interested listener to this discussion, and I want to emphasize the fact that if you will go back for twelve years, and turn

to the institute program, you will find two evening discussions, one devoted to educational topics, and the other devoted to the Ladies' Home Session. Have you looked at these programs, County Chairmen?

A Member: Why don't you keep on printing them?

SECRETARY MARTIN: We do; if you will examine the bulletins sent out. I would like to see the County Chairmen this winter at every two-day's institute have one session devoted entirely to education, and another devoted entirely to the home. I will be fortified in that course by the counsel received here to-day. The development of interest in Pennsylvania during the past twelve years has been largely along the lines of encouraging home talent We are trying now, this coming winter, as far as possible, to have every county chairman get certain ladies who are willing to work in their home district, and organize Ladies' Sessions in their home district, thus eliminating all the troubles that beset the ladies in their long travels all over the State. In each county, ladies are to be appointed, who will confer with the County Chairman, regarding the topics to be discussed, and then have them organize a Ladies' Session in the various districts in their home county.

This session has shown me that Pennsylvania is getting ready to take her proper place, and when that time comes, the ladies will have a proper share in this great work.

The CHAIRMAN: Here is another question along the same lines: "Should we aim to have a woman instructor on every force that can instruct the women along the lines of womans' work, especially one that can instruct along the lines of domestic science?" I refer this question to Mrs. Brodhead.

MRS. BRODHEAD: I think that we should have—certainly. It has been my idea that we should have. Domestic science is something that should be taken up more than it has—something that is needed to be talked about at our institutes, and I think that if each lady would take this up as a study, as has been suggested, and talk about our homes, and our work, and what goes to make a happy home. It would be a great help in institute work.

MR. McCLELLAN: Would it not be a good plan for the county chairmen, in making up their programs, in sections where we hold two or three day institutes, to appoint two or three ladies on the program, and let them decide whether they want to hold a joint session, or whether they prefer a session of their own?

MR. HOLMAN: Don't hold the ladies' sessions at night, because the evening meetings are always crowded, and their voices being low, it is difficult for them to make themselves heard.

MR. SEXTON: When I first took charge of the work some fifteen or sixteen years ago, as I have said, the great trouble was to get the ladies to work, and we had to solicit time and again before we could get them to help us. It takes time, friends, to get the ladies interested in this kind of work, but we are getting them there. And I am certainly proud of the ladies of Montgomery county. When it is announced that a Ladies' Session is going to be held, the halls

are not large enough. We try to hold them in the evening, so that we can get the mothers to come; often during the day they have no place to leave the children, and the older ones are at school. Now, we can do no better work than to get the boys and girls interested, and if we hold the session in the evening, we can not only reach the mothers, but the boys and girls as well. You men talk about feeding stock, and so on; now that does not interest the ladies, but they are interested in knowing how to take care of their boys and girls and their homes.

MR. PEACHEY: Now, there is just as much need of improvement among the institute workers as anywhere else, and I believe there should always be a woman on the force. Now, last winter there was not a single woman in the company I was; I don't know why, but I think it was because of the gang. Now, I have attended Ladies' Sessions, where I was ashamed to be a man; there was so much talk about the inferiority of the men; but I suppose it was all right; we probably deserve it.

Some one says "let the ladies read papers." I believe that this is the best. I believe it is hard for them to get up and talk offhand, although some of the best talks I have ever listened to at Farmers' Institutes were given by ladies, and they were just heart to heart talks. I believe the ladies have a splendid opportunity ahead of them, and I believe they are going to make use of it. Another thing you go into a Farmers' Institute where there are no ladies, and I tell you the discussion don't look so well. I tell you, the ladies are the balance wheel of the Farmers' Institutes.

MR. HOOVER: As Chairman and Institute Manager of our county, we always have tried to have a part of the work assigned to the ladies, and, if I recollect correctly, this session was always held in the evening. But I am heartily in favor of having them in the afternoon, because most of them are from the rural districts, and it is more pleasant to go home by daylight than by night. I am heartily in favor of allowing them to manage one session. That part is, if anything, more important than ours. We raise the things to eat, and they prepare them. The ladies' session is a good work, and should be carried out by every manager in the State.

MRS. ZIEGLER: I think one strong argument in favor of having a lady on the force, is the fact that her presence induces other ladies to come to the meetings. I have been at more than one session where a lady would come to the door and look in, and find I was the only lady there. She would be ready to go away until I beckoned her to come in. Then others would come, and see two ladies in there, and they would come in. This appears to me to be a very strong argument in favor of having a lady on the force at each institute.

MR. WAGNER: I am interested in the statement that the ladies are not interested in fertilizing, stock raising and so on. Now, we tried having a ladies' session in our county, but it was not much of a success; only two ladies came, and they took offense at something the lecturer said and left.

MISS THOMAS: Returning again to the subject of Domestic Science, I think it should by all means be introduced into our work.

The CHAIRMAN: Where could the director find the women qualified for the work?

MISS THOMAS: Maryland employed a lady very successfully, and the people were well satisfied with the result. I don't know where Domestic Science Instructors could be found, but imagine they could be secured at the Drexel Institute, in Philadelphia, and a number of women who are good practical housekeepers could do this work without special scientific training.

MR. BLACK: I would like to ask the lady a question: Will it be possible for the ladies to travel over the rocky counties of our State as well as the men?

MISS THOMAS: Well, I stood up as well as any of the men last winter. I will make this qualification: No woman should go into the work with the idea of going over too large a section, or for too long a period at one time.

MR. BLACK: Mr. Chairman, then I will agree that the Ladies' Session is a good thing.

MR. KAHLER: I wish to add my endorsement to what has been said in favor of the ladies. Now, the question has been raised, are the ladies able to stand the hardships of travel as well as the men? I want to say that I have traveled all over the State, with a lady in the company, and they have always held up fully as well as the men.

MR. NORTHUP: I had one opportunity of seeing domestic science exemplified by means of the "fireless cooker," by a lady from the northwestern part of the State. I have no hesitation in telling you who she was. It was Mrs. Allen. She is the only lady I ever traveled with, and she kept up very well with the rest of us. The only trouble was in lugging that fireless cooker. We got to one place, and they came for us with a wagon. Well, that wagon was packed with people, and there was no room for that cooker, but the lady would not go without her cooker, so finally the driver put same poles on the back of the wagon and strapped the cooker on to them. I will admit that he did say some words while he was doing it that are not found in the dictionary. We finally got to the place of meeting, and then she proceeded to demonstrate cooking without a fire. It was the first time I ever saw anything cooked without a fire; and even these things were not. Probably the thing was invented before people knew anything about a fire, but she had to go around among the farmers' wives and get the things started cooking, and then she brought them back, and set them in the cooker and finished them. After they were done, she handed around a piece of meat and a potato on a fork; why, I don't know, except perhaps so that we would not eat so much when we got out there. Now, those things may be all right, and I do not object to any lady on the force, but I hope the next one will leave her fireless cooker at home.

MR. PHILLIPS: Mr. Chairman, one word: I want to endorse everything that has been said along the lines of having a lady on the force. It was my privilege to travel with a lady on the force,

and—I know the other gentlemen will agree with me in this—the lady aroused such interest on the part of the audience that it was with difficulty that the rest of us got in our work.

Now, I want to go a step farther back, and refer to the "Man and Woman Crop" of which we heard the other evening. I want to make a plea for the boys and girls of the farm—for a discussion in which they are interested. We know that the public school system of our cities is a most excellent one, but we all know that it is designed to prepare for the higher schools and colleges, and only a small percentage of our boys and girls take this course. Now, I believe it is due us to recognize the boy and girl so that they will be prepared to take up our work among these old hills and valleys. I think there should be something to interest them at these meetings. Urge the parents to bring them, and then find something to interest them in our great work. I don't believe that 10 per cent. of the boys and girls at the age of fifteen have any idea of the wonderful advancement that is going on in agriculture. I believe that if we can get these boys and girls interested, Dr. Hunt will have to build an addition to his institution.

MISS THOMAS: I wonder if State College could not help us out in the line of Domestic Science? I think it has helped me.

DR. HUNT: I cannot talk about that officially, but I might say that through the liberality of Mr. Martin, we are thinking of having a fifteen weeks' course in Domestic Science. I have no doubt that when the proper time comes, you will learn all about it.

MR. BRODHEAD: Does not State College have a correspondence course in Domestic Science?

DR. HUNT: I think not. We have thirty-two topics which we teach by correspondence, some of which touch on Domestic Science. Prof. Mairs, who is in charge of the correspondence course, can answer that question better than I can.

MR. PEACHEY: It has been suggested that we change from the evening to the afternoon for the Ladies' Session. Now, I think that would be a mistake, for we want to get the boys and girls to attend them, and they are at school during the day.

SECRETARY MARTIN: I am glad Mr. Peachey has spoken of that. One of the principal features I have in mind in trying to organize a Ladies' Session in every county, is the home—which comprises every member of the family—father, mother, son, daughter, boy, girl, and make it complete in that respect, with special reference to the environment and surroundings, and in this way bring about a course of instruction that will magnify and strengthen this country home. That is the crowning object of all the work. What we are trying to do, is not so much instruct along scientific lines, as along the lines that will dignify the home in the strength of the Queen Mother, and in the beauty of its environments. That is what we are trying to do in our Womens' Sessions, and I am endeavoring to find in every five or ten counties of Pennsylvania a corps of twenty women, who will go into that section and give instruction along that line.

I am glad that our sister State of Maryland has devised some means of getting her ladies to the institutes, because from the report I had gained of her institutes, it was the exception rather than the rule to have the ladies attend the meetings, being by no means equal to Pennsylvania in that respect.

MR. KAHLER: Mr. Chairman, just one word in regard to changing the Ladies' Session from the evening to the afternoon. I can hardly endorse all that Brother Peachey has said, and think it would be a mistake to change the session to the afternoon unless you can make some arrangement with the School Board to allow the children to attend the institute.

MR. SHUEY: Get the high school to attend the meeting during the entire two days' session. We have done that now for two years at Schaefferstown, and you would be surprised to hear how many different questions those boys and girls ask the lecturers. As a result of it, we have more agriculture in our public schools than we ever had before.

PROF. MAIRS: In reply to the inquiry as to what correspondence courses we have bearing on home economics, I would say we have one on House Furnishing, Canning and Preserving, written by Sara A. Little, of Lyons, New York, who I understand is a very successful farmer and institute worker; Prof. Watts has written one on Vegetable Gardening; we have in the course of preparation on the Principles of Cookery, and another on Heating and Ventilating. This is about all we have now bearing directly on this subject. It may be that in the future there will be others, but that is all we have just now.

PROF. MENGES: May I refer to one thing? There has been organized in connection with Columbia University, in New York City, a Domestic Science Club; they are publishing a pamphlet, a copy of which I have at my house, and shall be pleased to show you. This will give you all the information you need in regard to this club.

The CHAIRMAN: "How can a Farmers' Institute Manager interest the indifferent farmers, and get them to attend the meetings?" I will refer that question to Dr. Detrich. He has tried to hide back there, but I am going to wake him up a little.

DR. DETRICH: You give me the most difficult topic of all. I do not know how to interest anybody in a better agriculture unless he has first a love for the subject. Now, I do not believe you can create an enthusiasm in anybody for anything that he has not first got a love for. Find out the boy's natural bent, and instruct him along that line. If he loves agriculture, he will be a good farmer; if he has no love for it, he will never make a success of it. Now, take myself; no person in the world could have made a mathematician of me. I simply studied enough to get through college respectably. History, literature—anything else I loved, and studied for love of it, but mathematics, never! Take one boy and talk to him about astronomy, engineering, laying the plans for building the structures of the earth, and he is all enthusiasm, but talk to him about what feed he should give a Jersey cow, or anything of that

character, and he is absolutely lifeless. Unless people have an inborn liking for certain lines of work, I do not see how it is possible to interest them in them. The same thing holds true with agriculture. The whole thing hinges upon the question as to whether he has a liking for it. I hate that doctrine of keeping the boys and girls on the farm. Do not attempt to keep them there unless they love the work. There are always plenty of boys in the city who are anxious to get to farming, while the country boy generally wants to go to the city. The thing to do, is to find for each the groove into which he is intended to fit. Now, I have been talking along the lines of scientific farming; I have seen enough of the other to know that it is made up of tradition, supersition, good luck, and hoodoo. Then I went into scientific farming, and now I have the privilege of writing on it, and I have not yet found any way to make farmers out of people who don't want to be farmers. You cannot make a farmer out of everybody, and unless the love of farming is there, your labor is in vain.

The CHAIRMAN: Now we would like to hear from some of the chairmen: This is a problem that confronts us all.

MR. HOOVER: I have been an interested listener to this discussion. In my own county I think the Movable Schools, have done more than anything else to arouse the interest of the indifferent farmer, but it has always been my practice to drive out to see these farmers, find out in what they are most interested, get them to talk about it, and then urge them to come to our institutes, where they would hear more about it. In this way they become interested, and become our helpers.

The CHAIRMAN: I should like to hear from Mr. Davis. of Clearfield.

MR. DAVIS: Well, I am more of a worker than I am of a talker. I can hardly tell you what I know. It is sometimes difficult, but if you can make a little business and go round and talk to these men, and if you have a lady lecturer, advertise that fact, and urge them to come to the meeting. It is worth the trial. It usually proves successful with me.

MR. RODGERS: When I first became chairman, we had scarcely anyone at the institutes, but I stuck to it, and I won. Now, the halls are not large enough to accommodate the crowds. In the locality where the institute is to be held, I have the program printed, and I put them in envelopes, and mail them to all the farmers with a special invitation to be present. If I had any special attraction, I would make mention of it, and ask them to bring their neighbors, and in that way I got them interested, and now we have three day institutes, to which they come for miles and miles.

MR. McCREARY: My experience has been that there are people who call themselves farmers, whom you cannot interest. I held the first institute ever held in Lawrence county; that was twenty years ago, and I have been at it ever since. But you take the fellow who knows it all; he won't go; the sloven, who is just a makeshift for a farmer, he won't go. I learned years ago that it does no good to bother these fellows, and I let them alone. Mr. Martin knows

that our institutes in that county are fairly well attended. Once in a while a deadhead gets into the force. On one occasion—Mr. Martin was there at the time—I had such a one. He was a stranger, and people were looking for something great, and so he was put on first in the Womens' Session. The house was crowded, and my instructions from Mr. Martin were that if the speaker did not come up to the mark, I was to report it. He held the people there for an hour, and what he said could be told in five minutes. I never felt as bad for an audience in my life. Afterwards I said to Mr. Martin, "I am very glad you were here, because now I will not have to report. Over in Venango county they had him on for the Ladies' Session, and I told the chairman "After that fellow talks for ten or twelve minutes, you ring him down." He said he did not like to do it, and they had just as hard a time of it as we had. Men like that are what the chairman has to look out for.

MR. McCLELLAN: With all due respects to Mr. McCreary, I think you should be censured for allowing a man like that to talk to an institute. I call them down.

MR. KESTER: I want to emphasize having the programs printed several days ahead of the institute, and distributing them. This arouses the curiosity to hear the speakers, and they generally come out.

MR. BARNES: I have had charge of the institutes in this county for the last five or six years, and my cheapest and best way to advertise is right through the public press. I get out my programs early, and have them printed in full in the county papers for sometime ahead. That may cut out the unintelligent and indifferent farmer, but it reaches the class that are interested, and they generally attend very well.

MR. BARTLEY: I have not had a large experience, having only been in the company since last year, but I have had some very successful institutes. I get out the programs at least a week ahead, and tell the people what we are going to discuss, and I send invitations to all the people of prominence, and the consequence is that last year we had more people at our institutes than we could take care of. At Mars I am told there were fully three or four hundred people that could not get in, and there were at least eight hundred in the church at our night session. Our attendance ran from five to six hundred right along.

MR. BRUCKART: So far as the attendance to certain things yourself is concerned, that is all right, but there are other things that are just as important. One is, the necessity of seeing that the program is carried out, and, for my part I would advocate putting a time limit on the program. I know that many will claim that they have an interesting subject, and would be allowed a little more time, but that is not fair to the rest of the speakers to allow any one speaker to encroach on their time. There is no use in wasting an hour in saying what can be thoroughly said in fifteen or twenty minutes, and the chairman should have this matter well in hand.

The CHAIRMAN: "Would it be advisable for each lecturer to prepare an evening lecture, and on what question?" I refer this to our friend Bob Seeds.

MR. HERR: I don't want to interfere with Mr. Seeds' talk, but there is a motion before the house that should be disposed of before adjournment for the afternoon. My motion was that we have a two sessions devoted to this institute work.

SECRETARY MARTIN: I believe that the motion made by Mr. Herr was laid upon the table to be taken up after the close of the afternoon session, when it should become evident whether an extra session is needed or not, to cover the discussion. We will, therefore, consider that motion this evening.

MR. SEEDS: You want me to say something about what to talk about at the evening session. Well, I'll tell you. Show the people how to live, rather than how to make more money. I take off my hat to the G. A. R. every time, but I am like my friend Dr. Dietrich, in this: I don't want to die for my country, I would rather live for my country any day than die for it. I tell you, there is a whole lot in getting up an evening session, and a Ladies' Session; there is a whole lot of good done by them; they are devoted to something more than money-making. Now, I have four boys and two girls, and don't know what I should have to live for outside of these children—but I want to teach them how to live, rather than how to make money. Near where I live is a man who owns five fine farms; a short time ago the preacher went around through the country, soliciting money to build a church. He went to this man, but the man had nothing to give him. "But," the preacher said, "you have a fine farm here." "No," said the man, "I have nothing to give; I don't belong to your church," and that was all he could get out of him, so at last the preacher turned away from the man who had five farms, but never had a home, because he doesn't know how to live, and said "Never mind; some day you will have to lay down and die, and leave it all behind." And the old fellow said, "Yes; and that's what makes me so —— mad." Now, that man with all his barns and farms, don't know how to live. Some men live longer in twenty years than others do that never die.

I tell you the Womens' Session, and the evening session of the Farmers' Institute is a good thing. I know what I am talking about, and I stand up and tell those married men when they go, to take their wives—not somebody else's wife, but your own wife, and bring her here, and let her enjoy the meetings the same as you do, and her outlook will become wider, and you will be the gainer from it.

Not long ago a man said to me—by the way, he owns three farms—that he did not take any stock in Farmers' Institutes; they were no good. Now, what does that man want? More barns; more beef cattle; more money? No; what he wants is to learn how to live. And I tell you, you have done a good thing in having an evening session devoted to the home. I have been all over this State, and I can tell you there are communities right here in our own state where I would not have my children grow up because the people don't know how to live. I am not talking about good clothes, or anything like that, but the moral tone of the community—the stinginess and narrowness of the people. And right here is where the Ladies' Session and the evening session comes in. You all know the story of Jack Hearn, in the State of Michigan; he was known

as the biggest liar in the State; well, once he shot two deer out of season, and the game wardens caught him, and he was brought up for prosecution, but his friends went out, and got a dozen of neighbors to swear that they could not believe him under oath and he was acquitted, even though he had admitted shooting the deer. Now, your reputation is what you make it yourselves. When a man has all the land and crops and grain he wants, and money in bank, and does not know how to live, what good is it to him? When Mr. Collingwood was reading his paper the other night on "The man and woman crop," I said "Amen, and amen!"

I like to talk to the Institutes in Pennsylvania, because my heart is in the work, and I believe we have a missionary work to do. I am going to try to carry a little sunshine everywhere I go, and see whether I cannot make somebody the better for my having lived. That is living.

FROM A COUNTY CHAIRMAN'S VIEWPOINT.

By W. H. STOUT.

It was my pleasure to introduce Farmers' Institute in my home county a few years later than their introduction in some of the counties, and to have acted in the capacity of chairman during this period, beginning under the auspices of the old State Board.

That the work has been of much benefit to Agriculture is not doubted. Beginning under unfavorable conditions with prejudices to overcome, bigotry to contend with, various opposing agencies to discourage attendance, we were even denied convenient and comfortable buildings wherein to meet.

The early institute meetings were held in shed and livery stables, the auditors being seated upon slabs resting on beer kegs. Slim attendance was the rule, but to-day, we hold our sessions in churches and halls, the audiences are large and show increasing interest. Requests for institutes are coming from all parts of the county.

Improvement in farming is evident in all sections and, while we sometimes feel discouraged, the benefits of institute work is more far reaching than is generally realized. One progressive man, adopting improved methods in a community, soon has imitators, "over-the-fence" farmers, as it were, imitators like their ancestors. These are hauling and spreading the stable manure instead of barnyard manure, while others even purchase chemicals instead of phosphate, because the institute lecturer advocate it.

There remain but a few, too dense to be benefitted, and the missionary work of the Department should be directed especially to aid such as have not seen the light of science and become converted.

The work should be done in those benighted, isolated sections, where the last century methods are still in vogue; where the cows have hollow horns, wolf tails, and lose the cud so that a gimlet, a razor and a dish rag shall no more be considered as specifics; where

the cobs from corn shelled for planting are thrown on the public roads or in fence corners; where the almanac, with its signs handed down by traditions from the time of the shepherds on the plains of Judea conceived the constellations and imagined them to represent beasts, fishes, dippers and chairs; also to localities where witches are believed to practice conjurations and incantations; where soothsayers thrive and powwowing is in vogue. There is a vast unexplored field yet to be redeemed from ignorance and superstition.

There are topics other than those of learning how to produce larger and better crops. These are the questions of economics; how to retain more of the fruits of one-s labor; how to obtain more dollars for use; more representation and to prevent excessive taxation.

The position of a county chairman is not an enviable one. He is without financial compensation, his efforts often are not appreciated, either by the audiences or the lecturers occasionally. Various questions are propounded by inquisitive auditors, as for instance. "Is he a farmer?" "His hands are so soft, he looks so well fed, fat and plump, puts on such airs of importance; if he has performed such wonders in dairying, poultry raising, general farming or other branches of agriculture, how can he afford to neglect such important industries that are so profitable and trust his work, his home and his daily accounts into other hands?"

Too many eggs, too much butter and milk, too large crops of any kind, too deep plowing, too much cultivating, and too much of the impracticable, casts suspicion upon a speaker. It is better to be moderate and occasionally admit that some mistakes have been made by him, and that better remuneration is derived in serving the State than in performing the duties involved in making records, on the farm.

Having served a long time as county chairman, and now being without further aspirations, the friends and good fellows sent into my district may be greeted by some one more ambitious, more talented and better able to perform the duties involved than I, your sometime comrade in the great work of ameliorating the condition of an overworked and underpaid worker in the most important of all industries, that of "the tiller of the soil."

The CHAIRMAN: It is now time for us to adjourn to take the excursion to York Haven. The cars will leave the Square at three o'clock, and I trust everybody will take advantage of this privilege.

Thursday Evening, May 27, 1909.
7:30 o'clock.

Mr. Weller in the Chair.

The CHAIRMAN: The meeting will please be in order. At former meetings we discussed the road question, and we have been talking about permanent roads, but it will be a long time before the roads of Pennsylvania will be permanently made. In fact, the dirt road, like the poor, will always be with us. I do not think it would be desirable, even if it were possible, to have all the roads macadamized. The ideal road is the dirt road, smooth and free from stones. Last fall, when these roads were dried, what a pleasure to

go over them, but when the rains flood the land, the last state of that road is worse than the first. Inasmuch as we cannot hope to have the roads permanently made, we are at least willing to learn how to improve our dirt roads—even from a man from Missouri, whom I am pleased to introduce to you—Mr. D. Ward King, who will now speak to us on "The Split Road Drag and its use for Dirt Roads in Pennsylvania."

Mr. King spoke as follows:

THE SPLIT ROAD DRAG AND ITS USE FOR THE DIRT ROADS IN PENNSYLVANIA.

By D. WARD KING, Maitland, Mo.

Mr. Chairman, Ladies and Gentlemen: It seems to me that men from Missouri must have made a reputation throughout the nation for being good-natured. I have traveled from Maine to Texas, and from the Gulf to Canada; I have seen the Pacific coast, but I have never been so far away from home that somebody did not joke me about being from Missouri, and they always expect me to take it good-naturedly, which forms the basis of my thought that men from Missouri must have established the reputation for being good-natured. It happens, however, that in this case the man who comes from the "show me" State, is in the show business.

I am not going to waste any time urging the claim of good roads. This term has been abused. It has been used so continually and emphatically to mean only stone roads, that it has become either a red rag, or a scare crow to the farmer, depending a good deal upon his disposition. If he is a fighting man, he gets mad, but if he is a conservative, peacable man, like most farmers are, he dreads it, because good roads in most instances mean only to the farmer more taxes—taxes that he cannot bear.

Now, I think that in a great many instances farmers are mistaken in feeling that way, but I believe that the strenuous advocates are responsible for his feeling. I have heard men say that they will not be satisfied until every mile of road in the State is covered with stone. It is the utmost foolishness to talk that way. Even if the State could afford to have stone roads on every mile of highway, I do not see how it could afford to keep them in repair. It will be many years before this State has 25 per cent. of its highways in stone; if you come to have 30 per cent., let us say, in order to be conservative, of your roads of stone in the next hundred years, you will have reached the limit. The average farmer on hearing the statement that there must be stone on every road, goes home and begins to figure on how many miles there are in his town-

ship, and immediately he sees that if there are 35 miles to be made at an average cost of $7,000 a mile, it will bankrupt him to macadamize the roads in his township.

Now, the point I am going to make is that you need only a portion of these roads covered with expensive material. On the other hand, there is no more strenuous advocate of stone and gravel roads than I am. I have always said, and say here, that where land is worth $30 an acre, and stone or gravel can be secured within three miles of the township, if that township does not put stone or gravel on its roads, it is not living up to its opportunities. That sounds dogmatic, but I mean every word of it.

It will be years before you have 10 per cent. of your roads macadamized. These roads must be cared for until that time. For many years to come, from 50 per cent. to 75 per cent. of your roads will have to be cared for as dirt roads. I noticed in the Harrisburg paper yesterday that out of 96,000 miles of road in Pennsylvania, you have 800 miles of State made road. Now, I had the opportunity of examining yesterday, the roads in the vicinity of York, and I spent yesterday in the examination of the roads in Dauphin and Cumberland counties, and I see that you farmers have just as much trouble in getting into town in the spring, as do the farmers of Illinois and Iowa. There was no particular trouble in getting over the roads yesterday, except that in certain places we had to go very slow to get around certain spots. I can pick out certain spots on those roads, dry and smooth as they were yesterday, that six months ago were impassible. Now, that is our problem. The important problem in the United States to-day is how to take care of our dirt roads.

Mr. Chairman, no speech on the importance of improving the roads can be considered orthodox, unless some mention is made at sometime during the speech, to the Roman roads, and, therefore, in order that this speech be considered strictly orthodox, I here and now make mention of it, but I ask you to go away back beyond the Roman road. Go back with me to the time when the nations of the earth lived in tents. A historical scene, the tent is pitched. A little slave girl hears that her master, the great man, is afflicted with an incurable disease, and when she hears the news as it comes trickling down through the tented household, she said, "There is a doctor over in my country that cures that disease," and the statement goes back through the household until it reaches the master. It is good news to him, because he has been hopeless. So he takes his chariots, and his warriors, and rich presents, and goes over to the doctor's house. His case is stated to the doctor, who does not even look at him. Elisha said, "Go, bathe three times in the river Jordan." The great man said, "I'll be hanged if I do anything of the kind. We have bigger rivers in my own country than this little stream in this little valley, and if I wanted to take a bath, I would take it there." But his servant says to him, "Master, if the doctor had told you to do great things, you would have been willing to do them; now, this is a little thing; why not try it?" So the great man went and bathed in the little river Jordan, and was helped.

You farmers, and your farms, have been afflicted with the leprosy of bad roads. Will you turn me down because I bring you a simple

remedy? "But," you say, "I cannot understand how this thing is done." Do you understand how the Jordan could remove leprosy? Why, gentlemen, there are a thousand things that you cannot understand. Don't turn down the proposition I bring you because it is too simple, I beg of you.

I don't know how better to bring this matter to your mind than by telling you in the simplest manner possible, how we discovered it. In doing this it will be necessary for me to make more use of the perpendicular pronoun than I like, but I am not here to tell you what some one else has done, or what somebody else thinks should be done in order to obtain certain results. I am here to tell you what my neighbors and I have done, and in order to do this it will be necessary to go a little into my personal history.

I will tell you that although I have lived on one farm for thirty years, when I went there I did not know how to put a collar on a horse. I knew a few things; I knew which end of the cow gives the milk, but that was about all. I had it all to learn. And do you know, Mr. Chairman, I sometimes think it was fortunate that I had it all to learn. There are farmers all over the United States to-day doing things simply because their daddies and granddaddies did them. I could not do this because mine had not done it. I had to talk with my neighbors, and ask their advice, and experiment, and finally I did get enough knowledge to run that farm. I was brought up in Central Ohio, in Springfield, and along about '79 I went to Missouri, and bought this farm, which was then about twenty miles from the railway station. The roads at that time were all the way from a quarter of a mile up to three miles wide. When we wanted to go out, we simply hitched up and drove across the prairie. The wheels sunk into the soft mud, and sluices formed between the ridges; then you simply formed another track.

My first road work was with axe and spade. I cut down willows, and dug them into the ruts, so that they would not grapple the horses. Since then I have had experience in all kinds of road-making. Within two years after I went there, the railroad came within two miles of the farm, and established a station within two and one-half miles, and it was not long before a little village sprang up. Between the houses was a strip of land 40 feet in width, which was called a highway, simply because it was legally called so, not because it deserved the name, and the same thing applied to the roads leading to the town. The more these roads were traveled, the worse they got. I have seen them so bad that I could leave my front door at the same time as my best horse and buggy, and get to town before it did. There was a clay hill on the way to town, and I have frequently found it necessary to rest the buggy on the way up that hill.

Twenty years ago I started trying to interest my neighbors in macadamized roads between certain sections and the town, and I am still trying to interest them. I went to Missouri in 1879, and in 1896 I started the road improvement that has brought me here this evening. I don't know the day; I think I know the month, and I don't know why I did it. Just that experimental twist, I suppose. I began the experiment with a pump stalk of tall oak pieces. These had been laid on the side about 30 feet apart and

held down by nailing strips on about 6 feet apart. Whoever made this implement—I don't know who made it—brought pieces of smooth wire along the pump stalk, and brought it back, making a loop, which had been prepared to bring in the corn stalks. Somehow, one day in March, 1896, I happened to have this implement hitched up at an angle of about 45 degrees, and drove down the road, as the quickest way to reach a neighbor with whom I had a little business. The road happened to be dry, but not sticky, and I drove that implement down the road with my two horse team, driving on each side of the rut. I was riding the pump stalk. After I was through at my neighbors' I turned and came back as I had gone. Because it was held at an angle of 45 degrees, the pump stalk pushed over the surplus earth into the ruts,—all the finer pieces—and carried the larger clods to the centre of the road. I got back home to the front of the house, and looked back and I was one of the most surprised men you have ever seen. It was a wonderful transformation. Figuratively speaking, I stood behind myself, and patted myself on the back, congratulating myself that I had the best piece of road within five hundred miles. And if that road were in no better condition to-day than some of the roads I saw yesterday, some of my neighbors would go out and telegraph me to come home and fix up my road, before I went out to tell other people how to improve theirs. And it is all due to that jagged oak drag, that has changed the habits of the people in the country. And yet, do you know, I kept that up for four years before any one else joined me! Finally a cranky neighbor started in. He waited until he had forgotten how he had laughed at me. By the way, my neighbor is a Pennsylvania Dutchman. We have lived side by side for thirty years, and I have never had a quarrel with him. I had a lawsuit with him over 75 cents, and got beat. He and his boys did my threshing for me while that suit was pending. It took Uncle Levi just five years to begin to drag his road; soon another neighbor followed, and then another, until finally the movement spread from the neighborhood all over the State, and from our State into the adjoining states, until to-day the State of Illinois reports 10,000 King Drags in use, with Iowa, Missouri, Michigan, Kansas, and, I think, Indiana, all having adopted them.

Now, what did I get when I went over that road with that rough drag? In the first place, made a smooth road. Then after I had dragged it for three or four months, I found that it was not only smooth, but that it got dry twenty-four hours before the other roads did. At the end of a year or eighteen months, it dried forty-eight hours before the other roads did. How did that happen? Well, it is simply one of the two or three things that happened, which I did not expect. Did you ever go to the wood pile, and find out the next morning that you had a splinter in your finger? You did not know how it got there, but you knew it was there. Then the next thing I knew, the hollow that was in the middle of that clay hill, from the top to the bottom, began to fill up. How that occurred, I don't know. I did not start to fill it up. We dragged it with the King Drag, and the rough clods were all drawn toward the middle, and the road filled up, and became hard and smooth. There is a half mile of road there now that has had nothing done to it in thirteen years except what was done by the King Drag.

After I had dragged my road for five years, my neighbors started in, and then, of course, the first thing they began to tell me how I must go about it. How many of you have had that experience, I wonder? You do something, until finally some one adopts the same idea, and then at once proceeds to tell you how it should be done! He knows better than you, of course.

One day I went down the road, and I found one of my neighbors dragging his road, and I said to him, "Isn't it a little wet?" "Well," he said, "it is a little wet, but I thought it was going to rain." Now, Bill Mills knew better than to wait until it rained. He knew if the rain fell, and found the little cups and saucers in the road, it would take at least two days longer to dry off. That little elevation in the middle of the road—you people here in Pennsylvania get elevations in the middle of the road, and then you keep out of the middle of the road.

Then another thing happened that I did not expect. One spring we had wet weather in Missouri. It was not a good steady rain, that rained and then was over with, but one of those continuous rains, where for days you will see nothing but clouds, and finally when you do see a little bit of sun as big as a dollar, you run and call all your neighbors to look at that treasure. Within twenty-four hours after the last rain fall, and after two weeks of wet weather, I had the drag out, and begun to drag my half mile track, and you should have seen the result. I was so delighted, that although I did it myself, I got right into my buggy and drove into town, and got the editor. There are two classes of men who get less credit than they deserve; one is the editor, and the other is the preacher. I don't see why this should be, unless it is because they are both, unfortunately, associated with the devil. I wanted some one to prove it. Now, at that time all my neighbors between my house and town were dragging. Some of them had just started, some had been dragging for a year, some for two years. And you could pick out the roads that had been dragged for two years, and those that had been dragged for a year. The road that had been dragged for two years showed up so much better than the road that had been only dragged for a year, and that which had been dragged for a year was a big improvement on the road which had only been dragged for a few months. And even those which had only been dragged a short time were much better than those that had not been dragged at all. I was astounded at the result. When I took the editor home, I loaded up the photographer, and had photographs taken of these roads, to prove my assertion, and Mr. Chairman, this thing has caused me more trouble than anything else in the world.

Now, let us go back again. One of the first things the King Drag does is to obliterate the old wheel tracks. The tronble with most country roads is that a man always travels where the man ahead of him traveled; I don't blame him. There is a place for the wheels, and for the horse, and pretty soon the track becomes a rut, and in Missouri they become so deep in the soft prairie soil that the axle tree begins to drag. Now, by the use of the King Drag, you obliterate the ruts; there is no excuse or temptation for a man to travel exactly where his neighbor did. Here is a road that is equally smooth, and travel is distributed.

Some of you think the roller is good for the road, but how many rollers have you got? Now, out in our country, we stop right there. Our soil there is not so difficult to handle as yours is here. We take only about 30 or 40 bushels of wheat as a wagon load, and an 1¼ inch tire is usually used, which gives more roller pressure to the square inch than any roller you can buy. The trouble is that we have been using rollers to slice the road—not to roll it. By distributing travel, we roll them.

Now, there is another thing before I go which is this. All of you who are farmers know that there are times when if you will place a bucket full, or a tub full of water into a hog wallow, you will find the tub full there in the wallow when the more level places are dry. Now, we go into the garden and dig a hole just like the hog llow. Then when we have dug the hole, we go into the house and get a tub full of water and empty it into the hole we have just made. Every person knows that before you have finished pouring, there will be nothing left but just bubbles. Now, in the hog wallow, the hogs rolled and rooted around until they have made a waterproof cement out of that hole. What I want to get at is, that you can make waterproof wallows of your roads. Every time it rains, and the roads get wet and are traveled, they get mud hollows. The bottom of the mud hole is waterproof. Now, don't get the idea that some of my newspaper friends get, that I am urging you to use the King Drag to do what the old hog does by wallowing. Now, after a heavy rain you may find 18 inches of solid mud in the road, and then comes another rain, and in traveling that road you will find spouted places. In Maine they call them "honey spots." We call them "seepy" places. Now, isn't it true that in bad weather, these places get into such a condition that when the horse takes his foot out you can hear it pop like a pistol? Then it becomes like stiff putty, and then along the first of July we will have nice, sunshiny weather. Well, what happens? Can't you go there and pick up a clod so hard and heavy that you could drive a tenpenny nail into it? Does it not take that spouted place longer to get dry than any other place? Now suppose it had been pounded and hammered for a number of years. You get elevation in the middle; you get ruts along the wheel tracks; you get a road of mud holes and chink holes and culverts. After I had been dragging my road for some time, the veterinary surgeon said to me, "I was by your house last night, and I could not tell where any culvert was except by the sound."

All these things come from the use of the split drag. You cannot find a seedy place, or a chink hole, or a culvert, where the drag has been used for a while. And all this can be done for one-quarter or one-third the money expended on stone roads.

Now I might go on indefinitely, but it is possible that you have some questions to ask on points where I may not have made myself clear.

SECRETARY MARTIN: We have a good many stones on our roads in Pennsylvania. What advice have you to offer regarding the stones?

MR. KING: In a general way, the Drag will cover all the stones that it does not move. That is more comprehensive than it seems. I drove over some roads here in Cumberland county where there were some "niggerheads" sticking up 5-6-8." If you use a drag for six months you will never have them.

SECRETARY MARTIN: What effect will it have on the round stones?

MR. KING: Gather them in the middle of the road. This leaves two places for travel on the outside.

(The Lancaster Automobile Club came in during Mr. King's address, and some of the members took an active part in the ensuing discussion.)

A Member: What kind of soil have you?

MR. KING: I have three kinds of soil in the half mile that I drag. For eight or ten rods I have what we call the black prairie soil, resulting from ages and ages of decay of the prairie grass; then I have the clay hills, and eight or ten rods of alluvial soil.

A Member: Does it become sticky after a rain?

MR. KING: Yes, sir; but it does not remain so, and that clay hill back of the house was rolled only once in thirteen years.

MR. DRAKE: Will the work of scraping the roads of Pennsylvania with a six-horse iron road scraper have a good effect?

MR. KING: Will you tell me what it costs a year to take care of a dirt road in Pennsylvania?

MR. DRAKE: Usually it costs from $25 to $30 per day, and perhaps a team and crew would make three or four miles a day.

MR. HOLMAN: About forty dollars.

MR. SCHWARZ: I believe the average in Pennsylvania is $37.

MR. KING: Does that include culverts and bridges?

MR. SCHWARZ: No.

MISS BAKER: I come from a section where Mr. King's drag has impressed itself upon the people as a saver in time and expense over the old-fashioned road scraper.

A Member: I have had a plank drag that does good work.

MR. KING: I prefer a split log.

MR. HIGH: Here is a picture of some roads in Lancaster County, showing some of the road scraper work.

A Member: Mr. High has brought that picture here for the purpose of showing what the average road scraper does, after using it nine months in the year; it represents a road kept in condition by a six horse team at a cost of from seven to seventeen dollars a mile. That picture shows the result, whereas some other pictures

he has brought show the difference between it and a road drag road. That road is the same winter, spring and summer; it has been cared for that way since grandfather was a boy.

MR. KING: That was the way we used to treat the roads in Missouri, but now one man with the King Drag can do the work of a six horse team.

A Member: What use is there for what is known as "water breakers" in Pennsylvania?

MR. KING: Theoretically there is no such thing as a water breaker. Practically I don't know anything about it for Pennsylvania. I say for Pennsylvania, because there may be some use for it on the hills here to rest your horses in going up a hill.

SECRETARY MARTIN: Suppose the read ran up for three miles, would you advise a clear open ditch on either side for a water break?

MR. KING: No, sir; a man has to depend on his judgment. If a man has money enough that is all right, but if he has not got money enough, it seems to me that I would carry the water across the road.

A Member: What degree of moisture do you consider the best for roads?

MR. KING: A road should be moist, but not sticky; every man must settle that for himself.

A Member: About what would you call a good plowing condition?

MR. KING: You farmers get to work and try it, and you will soon learn.

MR. COWAN: If the roads were dragged once a year with your drag, as is done by the road master in Pennsylvania now, would it be any improvement on the present system?

MR. KING: We are not here to discuss what cannot be done by the King Drag. We are here to discuss the best method of taking care of an earth road. If you will go over that road three times, at proper intervals, in February, March and April, that road will show up better than any other road in the community for a year.

MR. GOODERHAM: Does the township or the state build the roads in Missouri?

MR. KING: The counties and the townships generally take care of our roads. We have there probably a few more miles of macadamized roads than you have here in Pennsylvania, but not many.

MR. BRODHEAD: Do you have iron or steel on the front of the drag?

MR. KING: There should be three and a half or four feet on the ditch end of the drag.

MR. HOLMAN: What do you know about the two-horse grader?

MR. KING: They are made to sell.

MR. HOLMAN: For about twenty-five dollars,

MR. KING: You could not sell me one if I had the material to make a King Drag. They are no circumstance compared with the split log.

A Member: How large a log do you use?

MR. KING: The drag should be made out of a log from 7 to 9 feet long. The log should be split in the middle as near as possible, and then split at the front. The splitting should be done with a 2-inch auger, about 3 inches apart, and they should be brought together about 30 inches apart. It is then set on edge on the flat side. You drag it like a ladder at an angle of 45 degrees. I might say here that illustrated circulars are to be had for the asking. Just give me your names at the close of the session, and I will mail them to you free of cost.

MR. SEXTON: How heavy a log do you use?

MR. KING: Not over 12 inches through. I have made them from young saplings not over 6 inches through. A man in Missouri made one that did good work from a 2x4 inch. It is not the implement; it is the man.

MR. ROGERS: What does it cost you there to keep up your roads per mile?

MR. KING: From $18 to $50 per mile, to take care of the earth roads in Kansas, Missouri and Iowa.

A Member: What is the arrangement between the supervisor and the farmer in reference to road making?

MR. KING: Eight states have provided that road drags are to be paid from 50 cents to $1.00 per mile. In my State no one is paid. We are all proud of our work, and proud of having a smooth road to drive over. In Kansas they passed a law in 1905, officially designating the use of the King Drag in road making. This year they passed a law making it obligatory to use it in towns and cities at a rate of from 50 cents to $1.00 a mile.

MR. BARNES: In our county we have quite a good many stones.

MR. KING: I have tried to answer that question once this evening. There are several ways to overcome that difficulty. In Maine they blast out the heavy rocks. Seventeen per cent. of their roads are stone roads; the other 83 per cent. are kept in good condition by the use of the King Drag.

MR. HOLMAN: What is the best suggestion that you can give us as to a little reimbursement for these people who are enterprising enough to use the road drag?

MR. KING: Every good movement is started by people who are willing to do a little more than they are paid for—possibly a little more than the other fellow. I take it from the appearance of my friend over here that he is the kind of a man that is always doing something for somebody else, and is asking that question in the interest of others who are not so self-sacrificing, but this world

would not be worth living in if we could not do more than we are paid to do—more than our share. In 1905 I went over the Chicago and Missouri Railroad with the railroad people in their private car, in the interest of good roads. You never saw such a frost as we got. The same fall we went across that same part of the State on the Burlington, and met with little more enthusiasm. In January, 1906, they sent for me to come and help hold down the Legislature, because they had gone to the other extreme, and were going to introduce more King Drags than they could use for the time being.

MR. RODGERS: Any royalty on this?

MR. KING: No royalty.

MR. HIGH: I feel at this time like saying a word for Lancaster county; it is a little nearer home. I want to say to every farmer and to every one who is interested in good roads, that if you will send to the Lancaster Automobile Club, we will send you all the literature you want, and tell you about the drag. Look at that picture there; that road has been turned into a boulevard. Dr. McCaskey at his own expense, dragged that road, and they stopped him with an injunction, but they did not succeed in stopping the work. We went at it ourselves, and the club gave me a hundred dollars to go out and get people to make drags, or to make them for them, and give them away, if necessary, because we must have good roads. We expect to put out a thousand drags this year. We dragged six miles in one day in one township; in order to get the people interested, and to get good roads, we put on our overalls and got to work ourselves.

A Member: I can tell you a little of what we have done in Bucks county. We make every man keep his road in shape for $20.

MR. KING: You people have asked me questions, so now let me ask you a question. I hold in my hand a pamphlet showing an illustration of the King Drag, telling how to make it, what it has done and can do. This I will send absolutely free of expense to every person here. All you can do is to send me your name and address, written so that a Democrat can read it. Now I have not said that I am a Democrat, so don't assume that you know my politics.

MR. KAHLER: How many men in the audience have given this drag a trial, and what is your experience with it?

MR. HIGH: Strictly superlative.

MR. KING: Now, I am sorry you were not all here in the beginning. I want to ask a favor of you. I want those of you who repeat my speech to repeat what I saw, not what you think I said. Some time ago I visited a little town in Nebraska of about a thousand inhabitants, called Wahoo. I met some of the road authorities in the morning. They did not get to the meeting, but the next morning on the train I heard them talking, and after a while one of them asked me, "did you say so and so at the meeting." I said

"Yes; why?" "Well," he said, "I have been farming for forty years, and this is all new to me." He kept this up until I thought there must be some mistake, and it finally developed that he had understood I was talking about a harrow!

SECRETARY MARTIN: Now, ladies and gentlemen, we have enjoyed about two hours of good instruction on road-making. I am sure the farmers present will make good use of what they have heard. We will now devote about five minutes to listening to the report of the Committee on Resolutions, after which we will call on Prof. Watts to addresss us.

The following report of the Committee on Resolutions was read by Mr. Blyholder, and unanimously adopted section by section, as read:

REPORT OF COMMITTEE ON RESOLUTIONS.

That life is a mystery and the ways of Providence beyond our mortal comprehension, has again been impressed upon us by the sudden death of Bro. S. M. McHenry, of Indiana county, Pennsylvania, who, on April 22nd, passed from this world to that bourne from which none ever return.

Brother McHenry was a member of this State Board of Agriculture for some years, Manager of the Farmers' Institute in his own county, also one of the oldest members of the order of Patrons of Husbandry; he was faithful in attending to the duties pertaining to each of these; so interested was he that many times it was a great sacrifice to meet the requirements and demands of these organizations, yet he did it cheerfully.

Brother McHenry was born in the county in which he died, June 1844; raised a family of nineteen of which fifteen are now living. In 1863 he went to the army to nurse his brother, who was badly wounded; from this duty he joined Company A, 105 Pennsylvania Regulars, better known as "Pennsylvania Wildcats." He was wounded in the battle of the Wilderness, and after his recovery returned to his regiment, and was mustered out of service as a corporal, July 11, 1865.

To-day his place in this Board is vacant; we shall not hear his voice nor have the benefit of his council in these meetings again. Shall we sorrow? No. For we believe that all things are controlled by God and it was His will to call Brother McHenry home; and we bow in submission—hoping that when we, too, are called, we shall meet in that better home.

We extend our sympathy to the bereaved family who now mourn the loss of a husband and father.

Again, we deply regret the unfortunate bereavement of our brother and co-worker, H. G. McGowan, and in this sad trial we can assure him of our sympathy and hope the dear Lord will be near him in this sore affliction.

Let these sudden deaths be a warning to us all; let us all be ready when the call comes.

WHEREAS: It was deemed prudent and necessary for Governor Stuart to veto some of the excessive appropriations made by the recent Legislature.

THEREFORE BE IT RESOLVED: That we heartily endorse the Governor's action, and duly appreciate his effort to enforce eco-

nomical administration with a judicious expenditure of public funds; and further, that we condemn the practice of making excessive appropriations by our Legislative Bodies, and thus transfer from the Executive to the Legislative Department, the responsibility belonging to the Legislature.

RESOLVED: That the Farmers' Normal Institute do show our appreciation of the courtesies of the York Manufacturing Association, through its secretary, Mr. Robert E. Gephart, in giving us the pleasure of a visit to the York Haven Water & Power Company's plant at York Haven, and do hereby extend to them a rising vote of thanks.

RESOLVED: That the Farmer's Normal Institute do show our appreciation of the courtesies shown us by the York Haven Power Company, in opening their plant for inspection, through their Manager, Mr. E. A. Baker, and do hereby extend a rising vote of thanks to them.

RESOLVED: That we appreciate fully the courtesies of the York County Agricultural Society in opening the Fair Grounds and Buildings, and in extending us a free ride to visit these grounds.

AND WHEREAS: The local committee has so carefully looked after the details of arrangements, and especially Professor Franklin Menges, and by Mr. G. F. Barnes, the Chairman of York County, who by their untiring efforts have made our visit to York City both pleasant and profitable.

THEREFORE BE IT RESOLVED: That this convention hereby tenders its sincere and hearty thanks to all of those parties who so liberally contributed time and money for our comfort and welfare.

WHEREAS: The members of this convention have been co-workers in the cause of educational uplift and improved agriculture with the present Director of Institutes for a number of years; and

WHEREAS: They have always found him true to every trust, a judicious and persistent worker for better farming, better farm homes, better schools, better citizenship, and better government in all lines; and

WHEREAS: The present Deputy Secretary of Agriculture and Director of Institutes is a sterling living example of what a single individual whose heart, soul and energy is devoted to civic betterment, can accomplish:

THEREFORE BE IT RESOLVED: That we, as representatives of the great industrial and educational forces of the Commonwealth, and for the greatest good to the greatest number, do hereby pledge ourselves, and ask all good citizens to join with us, in using every honorable effort to place the name of Hon. A. L. Martin on the ticket in the next gubernatorial contest and elect him Governor of our great Commonwealth.

S. S. BLYHOLDER,
M. N. CLARK,
H. M. GOODERHAN,
PETER B. COWAN,
L. W. LIGHTY,
Committee.

SECRETARY MARTIN: I can assure you that the last resolution comes to me with a full surprise, and I cannot find words to express my appreciation of your approval given to me in this resolution, and by your vote. For the past twelve years I have labored with you in the great work. My ambitions, personally, could aspire to no greater position than that in which I am now engaged. If your ambition aspires for me greater things, the work is in your hands. I thank you for the honor this convention has shown me.

The CHAIRMAN: I will now turn the Chair over to Director Martin who will conduct the exercises for the balance of the evening. I am obliged to make a train.

SECRETARY MARTIN: It is now half past nine. Will Prof. Watts please come forward and take up his part of the program? We have at least an hour yet to devote to the program of the evening.

Prof. Watts then read the following paper:

SOIL IMPROVEMENT FOR MARKET GARDENING AND SMALL FRUIT CULTURE.

By PROF. R. L. WATTS, State College, Pa.

Market gardeners and small fruit growers in all sections of the country are deeply concerned regarding the improvement of their soils. They realize as never before that crop production is influenced by the character of the soil cultivated more than by any other factor. Good seed and good plants, proper methods of tillage, the control of insects and diseases are important factors and frequently discussed, but the absorbing question everywhere is, how can my soil be improved so it will produce larger and better crops.

The need of soil improvement is apparent. All classes of vegetables and small fruits are limited in yield by soil conditions. Four tons of tomatoes per acre is about the average yield in sections of Maryland where this crop is grown for the canneries, while in Erie county, Pennsylvania, the crop averages twelve tons. An eastern shore grower reports twenty-six tons and Professor W. W. Tracey, of the United States Department of Agriculture, reports ten crops that ran from thirty to thirty-six tons per acre. Asparagus growers generally rejoice when gross receipts amount to $150 per acre. A New Jersey gardener sold last year $5,000 worth of asparagus from ten acres. Ten tons of cabbage per acre is probably above the average. A Clearfield county grower, on one and one-third

acres, produced twenty-seven tons of Danish Ball Head which was sold for over $600, and Cornell University reports a crop from a small plat which yielded at the rate of forty tons per acre. Returns from celery usually run from $100 to $300 per acre. We sometimes hear of growers whose receipts exceed $1,000 per acre. A few hundred bushels of onions per acre is secured by most growers, while 1,000 or more are often reported. Two or three thousand quarts of strawberries per acre is probably the average. Successful growers frequently harvest 5,000 quarts. An Oregon producer picked 52,000 quarts from four acres last year, and Mr. Lowell Roundabush, the well-known Ohio Horticulturist, has been selling annually $60 to $70 worth of berries from one-twentieth of an acre and he thinks it would be possible to produce 16,000 quarts per acre.

Many other examples might be given to show the wide range in yields. It is sufficient to say here that not two per cent. of our market gardeners and small fruit growers produce maximum crops. Most of them are doing well but the fact cannot be denied that yields and profits are greatly limited by imperfect soil conditions.

The purpose of this paper, however, is to suggest means of soil improvement that may be employed by market gardeners and small fruit growers.

Drainage.

All classes of vegetables and fruits thrive best in soils containing a liberal and constant supply of moisture, but none of them succeed in water-logged soils. The first step, then, in soil improvement is to secure good drainage and it is useless to lime, fertilize, manure and cultivate before this has been attended to. To producers of limited capital, the cost of drainage seems high, but the assurance of increased profits justifies the expenditure.

Tillage.

Tillage is an essential factor in soil improvement, although its full importance is seldom recognized. We are accustomed to thinking of making soils better by the application of lime, manure, fertilizers and by the growing of clover, cow peas and cover crops, and the value of tillage in connection with these operations is underestimated. Deep plowing and the thorough pulverization of the soil to the depth of the plow furrow are essential to the largest yields. To accomplish this, the plow must be properly adjusted and held by a man who knows how to plow. The harrows must be adapted to the soil and the work to be accomplished. Smoothing harrows and spring tooth harrows have their place on almost every fruit and vegetable farm but they should not be used to the exclusion of disk and spading harrows. These types of harrows are especially effective when used on sods and heavy clay lands.

Another factor of great importance in soil improvement is harrowing at the right time and, in many instances, the right time is before as well as after plowing. Thorough disking before plowing not only reduces the labor of plowing but results in a finely pre-

pared soil to the full depth of the plow furrow. Every observing cultivator knows how readily the soil pulverizes when harrowed just at the right time. If too wet, much harm is done and if too dry, the clods are pushed aside instead of being crushed or broken. For small fruits and vegetables the utmost care should be taken to secure a fine as well as moist soil. To plow early in the spring and allow the furrows to lie unbroken for days or weeks before harrowing is contrary to the practice of our most successful growers.

The Value of Humus.

Soils poorly supplied with humus are never productive. Without a liberal supply of vegetable matter, the crops are small, late in maturing and poor in quality. Science and practice have taught us that humus conserves moisture, furnishes plant food, accelerates chemical activity, unlocks the mineral elements, favors bacterial life, secures porosity in compact soils, gives body to sandy soils, prevents the formation of hard crusts and reduces the labor and expense of tillage. Humus is the great need of all sections. The bank accounts of many Pennsylvania farmers are suffering because their lands are deficient in organic matter. New Jersey truckers as well as fruit growers are giving this question more attention than ever before. Professor W. F. Massey, who lives at Salisbury on the eastern shore of Maryland, has said over and over again that the urgent need of Maryland soils and of the entire South is more humus. Long Island vegetable and small fruit growers, too far distant from the city to transport manure by wagon, are beginning to realize that yields will soon diminish unless the supply of vegetable matter is increased. Gardeners and small fruit growers throughout the North are agitating the doctrine of more humus, and there is reason to believe that the general discussion of this subject will result in greatly improved soils and increased profits.

Stable Manure.

From the earliest history of market gardening and small fruit culture, stable manure has been recognized as the most valuable fertilizer. It not only supplies needed plant food but furnishes vegetable matter in the most desirable form. Enormous quantities of manure are used in close proximity to large cities. A Long Island market gardener, four miles from available supplies of manure, keeps a team on the road daily hauling manure which he applied on eight and one-half acres of land. When the land is occupied with crops, the manure is stacked in huge piles and given time to decay ready for the next year's crops. This particular garden plot it so rich in vegetable matter that it has the appearance of the best greenhouse soils used in the forcing of vegetables. On this little farm, stable manure is employed to the exclusion of all other fertilizers. The owner has very limited knowledge of commercial fertilizers and he has avoided their use. Yields, however, are very large because the soil has been made excessively rich and a perfect reservoir has been formed for the storage of water. The owner informed me that his crops never suffer from drouth. Ritchey Brothers, at Lancaster, Pa., are well known in the community as intensive market gardeners. They apply rotten manure annually at

the rate of over seventy-five tons per acre. The acre cultivated is limited but yields and returns are high. The liberal use of manure is the main secret of their success. Mr. M. L. Ruetenik, of Cleveland, Ohio, applies fifty tons of fresh horse manure per acre as a top dressing to his celery lands after the plants have attained a height of from six to eight inches. His success is well known throughout that region, receipts running about $1,200 per acre. Manure is the only fertilizer used by Mr. Ruetenik in the growing of celery. W. F. Allen, a well-known, extensive and successful grower of strawberry plants, small fruits and vegetables, of Salisbury, Eastern Shore, Md., depends upon New York manure for his supply of humus. Train loads of manure are shipped and delivered at the siding on his farms at a cost of $2.75 per ton. He claims that his great success would not be possible without the use of this manure. Numerous examples could be given of men who apply manure lavishly and no class of market gardeners or small fruit growers enjoys greater prosperity.

Clover.

The most extensive producers of vegetables and small fruits cultivating large areas should resort to the use of clover in a four-year rotation. This is unquestionably the most economical means of maintaining the supply of humus on a great many Pennsylvania farms. It not only increases the supply of humus but results in the destruction of disease spores and insects which are a constant menace to garden crops. It is not necessary to grow wheat in this rotation. Summer crops are often removed in ample time to sow clover and if the seeding is done before the 15th or 20th of August, in a moist, finely prepared soil, there should be a good stand of clover which would be sufficiently strong before cold weather to stand the winter. The crop may be grown the next year and the second crop plowed down late in the fall or early the following spring for manurial purposes.

Clover Crops and Green Manure.

The use of clover crops is becoming more general, but there is need of continued agitation in order to demonstrate their great value. Crimson clover is the most extensively used plant for this purpose in New Jersey, Delaware and Maryland and all other sections where soil and climatic conditions are favorable to the crop. It is an ideal legume as a cover crop because, with favorable conditions it is hardy and makes an extensive root system, which probably adds more to the store of humus than the tops unless the plants are allowed to grow much later in the spring than is the usual practice. It prevents the leaching of nitrates and, all points considered, is by far the best cover crop wherever it succeeds.

Rye is the most popular cover crop for northern sections but its proper use is not generally understood. Most growers use seed too sparingly, sow too late in the fall in poorly prepared seed beds and often plow the crop down earlier the next spring than is necessary. A number of examples have come under my observation in this State of men who have made decided improvements in soils by the use of rye and in every case not less than three bushels of seed per

acre has been used and in some instances four bushels. Such heavy seeding gives a close stand of plants and if not plowed down too soon in the spring, adds an immense amount of vegetable fiber to the soil. I have often found that it is desirable to allow the rye to attain a height of two feet or more before plowing. This can easily be done if the land is to be used for tomatoes or other crops started late in the spring. In plowing down a heavy growth of rye, it is important to have the plow and chain carefully adjusted so that the plants will be drawn in between the furrows rather than under them. Compacting the soil after plowing by the use of drag or roller seems to secure the best conditions for the decay of the plants. The addition of lime at the rate of several tons per acre at the time of plowing down heavy green crops, aids in the decay of the plants and helps to keep the soil sweet. A combination of rye and winter vetch make a better crop for manurial purposes than rye alone. Mr. R. F. Schwarz, the well-known and successful market gardener of Monroe county, who follows this paper with an address on Market Gardening, has found the combination to be exceedingly valuable in restoring and maintaining the supply of humus.

Some of the best examples of the value of cover crops and green manures can be found in New Jersey. Mr. Horace Roberts, of Moorestown, cultivates about 1,000 acres and no manure is used except that produced by the horses, mules and a few cows which are kept on the farms. His method is rather unique and certainly a complete success. Run-down farms are bought from year to year, planted at once in fruit trees and by a system of inter-cropping and the use of cover crops the land invariably improves in quality, the fruit trees thrive under such treatment and the profits pay for the land before the trees reach a bearing age. The fruit trees are set at usual distances and cabbage, tomatoes, cantaloupes, watermelons, sweet corn, or sweet potatoes are planted between the rows. Early peas, as Alaska, are planted wherever it is possible between the rows of other vegetables. Two hundred and fifty bushels of peas were planted on this farm last spring. The peas are harvested and sold before they interfere with other vegetables and then the vines are cultivated into the soil, thus adding rich material to the store of vegetable matter. This is an excellent plan and should be more generally adopted by market gardeners in all sections of the country. The favorite cover crop on the Robert's farms is crimson clover. It is invariably used if crops are removed soon enough to start clover so that the plants will become sufficiently strong to winter well. If crops such as late tomatoes are not harvested soon enough to start crimson clover, rye is used.

Mr. Lippincott, Moorestown, N. J., is a raspberry grower and uses some unique methods of companion cropping. He not only plants peas, but has found beans to be very good for intercropping, followed by a cover crop of cow peas. Oats would serve the purpose where it is too cool to grow peas. This system is followed during the first and second season after the raspberry plants have been started. A practice of some growers in Southern Jersey is to sow cow peas just as soon as the ground becomes sufficiently warm, plowing this crop down in time to start crimson clover. When some phosphoric acid is used with the peas, a fine growth is generally secured and the

clover may be cut for hay or, if needed for soil improvement, plowed down preparatory to starting tomatoes or other vegetables or small fruits.

Liming.

Lime is just as essential in market gardening and small fruit culture as in general farming. Wherever a legume enters into the system of cropping it is desirable to use lime. The physical character of the heavier types of soils may be greatly improved by the use of lime and it is especially important wherever clover is used in the system of cropping. The importance of its use is becoming very generally recognized in the Atlantic Coast trucking sections. It has been shown recently that some of the soils which have been cropped in vegetables for many years are becoming unproductive and this is due not only to a lack of vegetable matter but to an increase of acidity which is detrimental to the growth of many vegetables. D. W. Hull, Waymart, Pa., who is a successful grower of celery, applies lime frequently to muck soil in which this vegetable is grown. He claims that with the liberal application of acid fertilizers, lime is especially valuable and that yields invariably diminish when liming is neglected.

Fertilizers.

It is often claimed that commercial fertilizers do not improve soils and they are frequently credited with having injurious effects. The facts remain, however, that commercial fertilizers when properly used are not harmful to soils. Soils throughout the South on which fertilizers have been used extensively for many years have become hard, compact and unproductive. These troubles, however, have not been caused by the use of fertilizers, but by the failure to maintain the supply of vegetable matter. A too common practice is to use fertilizers from year to year as long as the soil responds to their application and a time is ultimately reached when yields and profits are decidedly smaller and no amount of fertilizer will grow good crops. Because of the impaired physical condition of the soil, the grower is apt to blame the fertilizer while the judicious use of cover crops and lime would not only have prevented these troubles but would have materialy increased yields.

One of the most important uses of commercial fertilizers in connection with the work of soil improvement is to stimulate crops grown for manurial purposes. It is often impossible on poor soils to secure a satisfactory growth of any crop intended for plowing down without the use of fertilizer. Nitrogen and phosphoric acid are valuable when used for this purpose and potash may also be essential. It often pays to use a high grade fertilizer carrying four per cent. of nitrogen and from six to eight per cent. each of phosphoric acid and potash in the growing of crops for soil improvement.

Irrigation.

Irrigation is foreign to the subject of this paper, but it is receiving so much attention at the present time by market gardeners and small fruit growers in the East that a few words on the subject may not be out of place. A liberal supply of humus in the soil is a great insurance against drouth. At the same time, growers realize that

their heaviest losses are from drouth. Water is the most important factor in the production of fruits and vegetables. Nearly all of our garden crops contain about 90 per cent. and enormous quantities are necessary in the process of growth. Various methods of irrigation have been used and described, but the overhead systems are becoming most popular among intensive producers. The overhead systems are especially desirable where soil surfaces are too steep, rough or uneven for ditch or tile methods.

The overhead systems are very simple to install. Provision of course must be made for a sufficient supply of water at a fairly high pressure. The plan consists of running overhead galvanized pipes in parallel lines forty to fifty feet apart and supported by pipe posts at intervals of about twenty feet. Special nozzles are inserted in the pipes at intervals of about four feet and a wheel or lever is provided at one end of each run. By means of this wheel or lever, the pipes may be turned in such a manner that several rows of plants are watered at one time and when sufficient water has been applied to certain rows the pipe is again turned slightly and water applied to other rows, repeating this adjustment until the entire area has been covered. It is claimed by men who have tried a plan known as the Skinner System of Irrigation, that it is a most economical and satisfactory means of watering. There is uniform distribution of the water; it falls in such a diffused mist that there can be no possible injury to the plants; just enough water is used at any one time to meet the needs for a day so there is little possibility of getting a surplus of water into the soil should heavy rains fall after watering. A decided advantage of this system over other methods is that the water is applied in a mist or fine spray, thus avoiding packing the soil and it is absorbed as fast as it falls, preventing hard crusts. Other advantages are claimed for the overhead systems, and it is believed by many experienced growers throughout the East that the plan will be generally employed in all intensive work when the supply of water is ample and the pressure sufficient to insure proper distribution.

MR. SCHWARZ: I move that the next paper be printed, or it may be read tomorrow morning.

This motion was properly seconded, and carried in the regular way.

The CHAIRMAN: Any questions?

MR. SCHWARZ: In reference to this surface irrigation, where it is discontinued for a while, will not the plants suffer?

PROF. WATTS: It is merely a mechanical way of watering the plants, and should not be discontinued while there is necessity for moisture.

MR. WOLFF: What do you know about sub-irrigation?

PROF. WATTS: I have never tested it, but I do not favor it be cause in most soils it goes down farther than it goes up.

A Member: Do you not find that where the soil is filled with nitrogenous bacteria, the weeds are not so troublesome?

PROF. WATTS: You mean the more bacteria, the less weeds? I don't think there is any relation between the two. That is, that the bacteria that keeps up the growth of the legumes keeps out the weeds.

The address prepared by Mr. R. F. Schwarz on "Market Gardening and Small Fruit Growing for a Profit," which was to follow, and which on his own motion was to be printed instead of read, appears below:

MARKET GARDENING AND SMALL FRUIT GROWING FOR A PROFIT.

By R. F. SCHWARZ, Analomink, Pa.

We have been listening with pleasure and, I think, profit, to the interesting papers on, and discussions of, what are known as the larger Farm Topics, such as Fertility and Soil Moisture, Alfalfa, Corn, The Dairy, Sheep, Cattle and Horses, besides Orcharding, and Poultry, and have been impressed by each succeeding speaker with the fact, that his particular line was the special one of greatest importance to the welfare of the country.

But after all, we should remember that conditions are constantly changing, that our population is becoming more and more congested, that the day of the 200 acre or 100 acre farm is going by, and that the time is coming, and coming fast, when smaller areas of land must support the individual.

Intensive culture then must take the place of extensive operations, and the raising for use or sale of fruits and vegetables must be the solution of the living question with thousands of our people.

We in America, have been a meat and flour consuming nation to a greater extent than any other; we have filled our systems with starchy paste, concentrated protein in meat and carbohydrates in fats, and we have become known by reason of this as a nation of dyspeptics. The constantly raising prices of these foods will make it more necessary to supplement them with the cheaper products of the garden and the berry patch, and the great blessing is, that this cheapening will bring with it, also better National digestion and health.

Associations of wealthy philantrophists, are making an effort in our cities to convince the almost starving thousands of the possibilities of the market garden, located on cheap land, as near as may be to cities or towns. The little land league of New York in its platform and prospectus says:

"When the people realize that with 250 days work in a year, two acres will support an ordinary sized family, and produce enough readily marketable surplus to provide money for clothing, and to keep the roof over their heads in good repair.

"When they find that two acres of suitable land can be purchased very near to civilization for from $50 to $200 an acre.

"When they understand that a home can be built on these two acres more healthful to live in, far more comfortable with pleasant surroundings and fewer nuisances than in the large city, and that all this can be done for a few hundred dollars, or far less than they now pay as rent in a comparatively few years, when they know that then locating on the land, makes their property as good security for loan as city real estate, and that with no more work at the start, and much less later on, they can establish themselves to much better advantage in the country, and can raise stronger, more healthy, and better minded children than in the city.

"Then there will be fewer men and women walking the streets with the furrows of anxiety worn into their faces, and fewer in the ranks of the unemployed. The hospitals, orphan homes, penitentiaries, jails, reformatories and lunatic asylums will be less numerous, we shall be able to cope with overcrowding in the trades and professions, and life will be better, more satisfactory and more happy for us all."

Bolton Hall the eminent Sociologist and writer says: "There are within easy distance of New York, Chicago and all our great or greater cities, thousands of acres of good land lying absolutely idle, enough to support almost as many thousands of comfortable homes, while here in the city are thousands of able bodied men and women constantly on the verge of starvation, who should only be too glad to go to the land, if they knew of it, and had any idea of how to make the land keep them, and their families in independence."

I mention this only to show that the men and women of our city realize more strongly than do those of the country the possibilities that lie in the intensive cultivation of land.

So that those of us who are in the business want to get our reward down here on earth, and a more material reward than that of knowing that we are benefiting the digestion of our fellow beings.

Great and from my standpoint unfortunate changes have taken place in the market garden and fruit business in the 33 years I have been engaged in it, and new methods, new calculation, new means of distribution, have had to be applied over and over again as years brought forth these changes.

Then, every neighborhood, even our cities, looked only to its near surroundings for its supply of vegetables and of fruits. Railway or steamship transportation of this perishable produce had not been introduced to any extent, and the man who could first bring into his market town the green onions and radishes and lettuce of spring, the peas and beans and cabbages of early summer, and the ripe tomatoes, sweet corn, and lima beans of the later summer, was the man who could set his price and get it too. To-day, all that has changed, seasons for particular produce have been wiped out, and one might say that there is not a single day in all the year when you cannot in our great city, and even the smaller town-markets, buy fresh tomatoes, cucumbers, and the whole line of perishable vegetables, and also strawberries all grown in tropical or semi-tropical lands, and brought here by modern transportation methods; partly refrigerated, and partly left and exposed to atmospheric and climatic influences, which leave the produce in any but a fresh and healthful condition.

Then, the fruit hunger of the denizens of our towns not surfeited by the winter's daily consumption of oranges, pineapples, bananas, grape fruit, and other less known fruits, but restricted to apples and dried and home canned fruit asserted itself when strawberries first arrived, and the man who brought to that market the first early product of his strawberry beds, could and did realize a handsome profit. To-day Florida strawberries are here in January, followed by Louisiana, South and North Carolina, Tennessee, Virginia, and Delaware fruit, until the great mass of people are surfeited with that delicious fruit, and only willing to give a suitable reward to the home producer for his far higher quality and fully ripe offering.

To show how railroad and transportation interests have encouraged this enormous movement of this class of produce, I have here some interesting figures taken from a recently issued book on the railroad freight rates, in relation to the industries and commerce of the United States.

On potatoes per barrel of 2½ bushels the freight rate is $1.05 from Florida to New York, 65 cents from South Carolina, 45 cents from North Carolina, and 30 cents from Virginia.

On tomatoes the freight rate per carrier of 6 four quart baskets is 75 cents from Florida, only 45 cents from Texas and 40 cents from Mississippi.

On cantaloupes the freight rate to New Yory ranges from less than 1 cent apiece from the Carolinas, to 2¼ cents apiece from California.

Oranges from Florida pay the railroad from 4 to 9 cents a dozen, according to size, and those from California 6 to 12 cents per dozen.

It is true that light as these freight rates seem, they and the cost of package score heavily against the profit of the Southern product, and it might at first sight be thought that this extra tax on Southern produce should be enough advantage to the Northern grower, but against this must be taken the fact of the greatly longer growing season of the far South, and their ability to grow three crops almost and two crops always when we can ask but one from our soil.

If this were all the change, the Northern market gardener might still live in ease and contentment, but it is not all, nor is it the most serious change. The greatest factor in the reduction of prices of such fresh vegetables as are effected, has been the astounding extension and expansion of the great canning industry of the country. The periodical attacks made on the healthfulness of canned vegetables and fruits because of the use of certain preservatives, and coloring matter tend occasionally to check the advance of this industry, but the scare soon wears off, and the use of canned foods keeps on increasing. This may not be true as much in the supply to private homes, but it is true more and more in the supplies of hotels and boarding houses, where year by year, a greater and greater percentage of our population are domiciled. The serious difficulty in obtaining suitable domestic help aids the canning industry greatly, because it relieves the kitchen help from the tedious preparation of the raw vegetables, and yet how few of us would care for canned goods if they could see, as I have seen, how they

are handled in some of the canneries. The soul revolts and the stomach rises in protest at the thought. It is on the par with Dr. Funk's Italian, spitting on an old dirty stocking, and polishing his fruit with it.

There have on the other hand been changes in these 33 years that tend the other way, and enable the market gardener to produce better and larger crops than he did at that time, and to produce these better and larger crops much more cheaply than he could before. These beneficient changes have been in gardening tools and machinery and in the improvement of variety of both vegetables and fruits.

First; considering the improvement in tools, I well remember when in 1875, I purchased personally from S. L. Allen, then in a small upstairs loft in Market St., Philadelphia, the first practicable wheel hoe introduced on the market. Heretofore the hand hoe of various shapes and the rake of different width, had been our garden tools, and how we rejoiced at the quicker and more effective work done by this first primitive wheel hoe. Now, dozens of firms are striving with one another to produce and they are producing, wheel tools with which you can perform almost any garden operation.

Then, we had a limited seed list, the old early York cabbage, the old fashioned and curled and plain lettuce, the Marrowfat pea, a few watery varieties of tomatoes, one variety of high climbing lima beans, and so along the line of all the vegetables were the best we could do. See what the wizards of Horticulture have accomplished since! Solidity, size and weight, have been given to cabbage, to lettuce, and to tomatoes, and the seed has been selected and selected until we can count on 90 per cent. of perfect produce now, where 50 per cent. was the best we could then. Every other vegetable and fruit have been improved in that way, and earliness has kept step with increase in size and quality.

Taking conditions then as they are, what must the modern market gardeners do to derive the greatest profits from his fruits and vegetables? And in considering that question, I must consider as well, him who like Professor Watts, located where the market is ready, as him who living away from market with his land on his hands, has the greatest difficulty in disposal of his crops.

First then, we must study the possibility of our market, and grow those things which seem to promise us the greatest returns. If the most promising crops are cabbage, tomatoes, and corn, then let us devote all of our energy to perfect productions of these. If a greater variety of produce promises results, let us grow that greater variety; that question solved, will determine the amount of greenhouse, hot bed, or cold frame, glass surface, we need; for even if we have no market for winter crops grown under glass, it is essential that we produce our own plants, especially of cabbage, cauliflower, tomatoes, egg plant, and peppers. I would rather trust the reliable seedsman than the wholesale grower of plants to give me the special variety I prefer and want. The latter is too often apt to substitute, and many failures of profit in crops have been due to such substitution.

Second; we should so fertilize our soil, whatever it may be, that it will be able to give us ample and full returns in the crops we ask of it, this part of the subject however, has been assigned to Professor Watts, and I shall leave it alone for the present.

Third; we should and we must so thoroughly and completely prepare that soil, by proper and deep ploughing, by disking, by harrowing, and by cultivating that every clod is crushed, that every lump is pulverized, and that we have the most perfect condition of seed bed it is possible to prepare. Only by doing this can we bring those two most absolutely necessary elements of success, fertility and moisture, together in such combination as the crops we propose to grow demand. Always remember that excepting only the case of the severest drought our supply of moisture depends on that preparation of the soil, and on the constant ever repeated cultivation of our crops after planting. Also remember, as Professor Shaw has pointed out to you, that we need thousands of tons of water in our soils for ordinary crops, and additional thousands of tons for our vegetable and small fruit crops.

Fourth; this expensive supply of fertility, and this expensive cost of preparation entitles us to demand from the soil constant exertion, constant work, that we may find our profit and reward, and to have that reward as great as possible we must plant as closely as possible, and obtain as many crops as we can from the same soil; thus we plant early cabbage and lettuce, cabbage and horse radish, parsnips and radishes, beets and early turnips, peas followed by celery or cabbage, beans followed by cauliflower or celery, onions intersown with spinage and radishes; always making such combinations as will prevent the interference with one plant of the other. We now carry this to greater extremes even in small fruits.

Our early corn, and potato fields are interplanted with strawberries, in the rows of strawberries are planted raspberries, 4 feet apart, and every 20 feet a peach tree, this gives us the corn and potatoes for this year's crop, the strawberries for next year, the raspberries for the next three years, and then the peaches, cultivating as best we can, and saving a year's time on the small fruits, development for full fruiting.

This growing of crops is necessary as I said before, to repay us for the manure, the large quantities of highest grade fertilizer and the constant working of the soil.

Fifth; the use of the best, the most suitable, the most perfect machinery of all kinds, is essential to our success, since old fashioned tools and implements could not be worked in the small spaces we leave between rows. We must produce cheaply, and yet we must produce the best that can be raised to obtain and hold our market, and too much emphasis cannot be put on the proposition that we must make up our minds to accept.

Give us a soil as free of stones and rubbish as possible, give us the manure and fertilizers, give us the implements and the workmen, and if we understand our business, we can excel and in that excelling, lies our profit, let the market be what it may.

On land less smooth, and therefore less adapted to intensive close planting, we can grow blackberries, blackcaps, and red raspberries, interplanting these for the first two years with crops of sweet corn and giving the best cultivation possible on rough land, and even there, we can and do obtain results far outreaching the returns from any ordinary farming.

Profits in the productions of fruits and vegetables may not be as great as they once were, but in spite of all drawbacks,—the constantly increasing population and the lesser inclination of the town dwellers to have his own garden, and the consequent possibility of disposing of larger quantities still leave a field to be worked profitably, though the slipshod and slow methods of the past must be relegated to the past, and for the gardener or small fruit grower of this day are required, high aim, application of constant study, a more full and deep knowledge of the soil and of plant growth, energy, perseverance, and last but not least, brains.

SECRETARY MARTIN: I would call your attention to the last session of our Institute, beginning to-morrow morning at nine o'clock. Some of the best and most important subjects are on the program for to-morrow morning. Many of the members have been called home, but I trust most of you will be there. We will now stand adjourned until to-morrow morning at nine o'clock.

Friday, May 28, 1909,
9 o'clock A. M

Mr. A. P. Young in the Chair.

The CHAIRMAN: The meeting will please come to order.

SECRETARY MARTIN: If any of the members have not yet received their vouchers, they will please see the clerk and get them. Or, if you do not receive them before you leave, I will send them to you by mail. Get a receipt from the hotel, as has been our uniform custom, and on the voucher simply mark the railroad fare and number of miles traveled. No receipt will be required for this. This is our last session, as you are aware, and a number of our delegates have been called home by the fact that they celebrate Decoration Day in their localities on Saturday.

The CHAIRMAN: We will now take up the program. The first topic is "Corn Improvement by Selection, Breeding and Testing," by Prof. Frank D. Gardner, State College. Prof. Gardner will now address us.

Prof. Gardner spoke as follows:

CORN IMPROVEMENT BY SELECTION, BREEDING AND TESTING.

By PROF. F. D. GARDNER, State College, Pa.

At the present price of corn, ten kernels added to each ear produced in Pennsylvania would add to the pocket-books of the Keystone State farmers $780,000.00. Although Pennsylvania is not one of the great corn states, this will give some idea of the importance

of the crop. By a little attention to the selection and breeding of seed corn, the crop can be increased by this amount not only next year, but for several years to come.

I am loath to suggest any thing that will make the farmer more work, but I know of nothing that will come so near producing something for nothing as that of giving a little time and attention to the improvement of corn by careful selection and breeding and to securing a full stand by germination tests and careful planting.

Securing Seed.

When a farmer is dissatisfied with his corn he should secure new seed. He should not send far away for it, but should purchase of a reliable grower who produces it under climatic conditions and on soil similar to that on which he is to grow it. It should be purchased in the ear so that he can see if it is as represented in regard to type, size and uniformity. It is not enough to merely start with new seed, but he should still further improve it by selection and breeding, so that it will be suited to his soil and conditions. If he can't do this, he should purchase each year, seed that is selected and bred for his conditions.

It is just as important to use well-bred seed corn as it is to breed from an animal having a good pedigree. The same principles apply to the breeding of both plants and animals. Five dollars per bushel is none too much to pay for good seed corn. Well bred seed corn will produce from 5 to 20 bushels per acre more than seed to which no special attention has been given, when grown under identical conditions. A bushel of seed will plant six acres. Ten bushels increase on each of six acres equals 60 bushels. This at 60 cents per bushel is $36.00, the value of a bushel of good seed.

Selecting Seed.

Selection should be made in the field where both plant and ear can be seen. Good plants should be of moderate height. Short nodes or joints are preferable to long nodes for each node bears a leaf. The more the leaf surface the greater the power of the plant to manufacture the elements of air and soil into corn. The leaves are the most palatable, digestible and nutritious part of the forage. The plants should be free from smut, rust and any other fungus disease.

The ears should be attached to the stalk at a convenient height of about four feet and by a shank of moderate length and thickness. When too long, the shank allows the ear to pull the stalk over and when too short the ear is too erect and may be damaged at the tip by allowing water to enter the husks. The husks should be moderate in amount and sufficiently long to cover the tip of the ear, and protect the kernels from insects, birds and damage by rain.

A good seed ear should be eight to ten inches long, (for a medium maturing variety). The circumference two-fifths the distance from the butt should equal three-fourths but not exceed four-fifths of the length. The form should be cylindrical or but slightly tapering

from butt to tip. The tip and butt should be well filled with kernels and the rows, sixteen to twenty in number, should be straight and carry out well to the butt and tip with kernels of regular and uniform shape.

The depth of the kernels should equal one-half the diameter of the cob. Kernels five-eighth inch long, three-eighth inch wide and one-sixth inch thick are a good size. The tips should be strong and full for such indicates good vitality. The embryo or germ should be large and extend well up toward the crown. Large embryos produce vigorous plants and indicates high fat and protein content and consequently high feeding value.

Care of Seeds.

After selection, the seed ears should be well cared for by storing in a dry and well ventilated room and out of the reach of rats and mice. If thoroughly died, corn will stand a very low temperature without injury, but if not well dried temperature not far below freezing will injure or destroy its viability or germinating power and make it worthless for seed.

Vitality Test.

The importance of securing a perfect stand of strong plants in the corn field cannot be overestimated. Aside from field conditions favorable to germination and the proper placing of the corn in its seed bed, there are two dominant factors on which perfection of stand depends: First, the vitality of seed. Second, requisite number of kernels in each hill or regular and uniform spacing if planted in drills.

A vitality or germination test of seed corn should always be made. It should be made several weeks before the seed is required for planting so that there may be time to secure a new supply in case the seed has been injured. March is a good time to make the germination tests. There are many simple methods for making such tests, but in all cases each ear should be tested. Experiments indicate that five kernels taken from each ear is sufficient to determine whether or not the ear should be used for seed. The kernels should be taken one from near the butt and another from near the tip and the other three at about equal intervals along the length of the ear, rotating the ear so as to take them from different portions of the circumference. These five kernels should be placed in a compartment of the germinator and the ear marked or so placed that it can be located after the test has been made. The requisites for germination are air, warmth and moisture. The temperature of the living room or kitchen is about right providing it does not fall below forty-five degrees at night. A satisfactory germinator can be secured by making, out of seven-eighth inch pine lumber, a shallow tray one and one-half to two feet square and about two and one-half inches deep. The sides of the tray should be made preferably out of seven-eighth inch lumber, while the bottom may be made out of one-half inch material. The tray should be filled to within an inch of the top with thoroughly wet sawdust, or if sawdust is not available, sand or ordinary soil will answer the purpose.

Place over the sawdust a piece of muslin the same width as the tray and twice as long, marking one-half of it into small squares about one and one-half inch each way and numbering these consecutively. The marking may be done with an ordinary soft pencil or preferably with an indelible pencil. The seed ears to be tested should be arranged in rows on the shelves of the seed house, or on a table or on the floor. Beginning at the left hand end of the upper row take five kernels from the first ear, calling this No. 1 and place these five kernels on check No. 1 of the marked cloth in the germinator. From ear No. 2 take the same number of kernels and place in check No. 2, and so on until all checks or squares in the tray are occupied.

In removing the kernels from the ears one should be taken from near the tip, another from near the butt and three from the intervening portions of the ear, revolving the ear as the kernels are removed, in order to secure representative samples of the corn. When the germinator has been filled, the unmarked half of the muslin is folded over the kernels and a layer of about one-half inch, of thoroughly wet sawdust is spread over this. When the germination is completed the upper sheet of the muslin is turned back, sawdust and all, in such a manner that the corn is plainly visible, and one can see if any kernels in any checks have failed to germinate. Any ears which failed to give five kernels that germinate vigorously should be rejected. A handy man working systematically can test five or six bushels of corn in a day. It is work that should never be neglected and will pay for the labor involved many times over in the better stand and resulting larger yields of corn.

Preparation for Planting.

Before shelling the corn for planting it is important to remove all irregular kernels from the butts and tips of ears, not because they will not produce just as good and vigorous plants as the kernels from the middle portion of the ears, but because of their irregularity that will not allow them to pass through the corn-planter with uniformity. A planter cannot drop regularly unless supplied with kernels of a uniform size. Probably all of you have attended the country fair and doubtless may have observed the exhibit of corn planters along with the other agricultural machinery and have been impressed with the uniformity with which the planter dropped a definite number of kernels on the endless belt as it passed slowly beneath the shoe of the planter, but you may have failed to note that the few quarts of corn that was used over and over again in that process was remarkably uniform in size and had probably been hand-sorted. Aside from removing the irregular kernels at the tips and butts, the ears before being shelled, may be assorted into two or three lots according to the size of kernels and the shelled corn from each kept separate so that the planter plates may be adjusted to each size. The same results may be secured by the use of two sieves, one with meshes sufficiently large to let the small and medium sized kernels pass and the other of a size that will let only the small kernels pass. There has recently been put on the market by the Monarch Self-feeder Co., of Cedar Falls, Iowa,

a corn grader consisting of a cylinder having different sized openings through which the corn is passed. Such a grader would no doubt give greater uniformity than could be secured by flat screens.

The planter should, of course, be carefully adjusted to each lot of seed. A poorly adjusted machine may offset the advantages that would be derived from the carefully selected and graded seed, and the adjustment should therefore never be neglected. Many corn growers would be surprised to learn how imperfect a stand they have. It requires an actual count of the number of missing hills on an acre and those that have less than the required number of plants to the hill to learn the truth.

As a result of investigations made by the Indiana Experiment Station in 1907 in numerous fields in various sections of that state, it was found that the average farmer secured not more than three-fourths of a full stand, when in reality he should have from ninety to ninety-five per cent. of a stand. If three-fourths of a stand will produce forty bushels to the acre, what will ninety-five per cent. of a stand produce? The observing farmer will soon learn that it pays well to spend time in preparing his seed corn.

What is a Stand?

A full stand for one soil or locality may differ materially from that of another. Obviously it depends on the fertility of the soil, the character of season and the variety of corn. The more fertile the soil the greater the number of stalks that may occupy an acre and each produce an ear. The more favorable the growing season the more stalks may occupy an acre and the smaller the variety the thicker it can be planted. On land of good fertility 10,000 plants to the acre is a good stand. With hills three feet eight inches each way and three plants to each, an acre would contain 9,720 stalks. When planted in drills one kernel every fourteen inches with rows three feet eight inches apart, an acre will contain 10,179 stalks. On good soil and for average years I would suggest that these rates are the most desirable for the production of corn. If planted chiefly for fodder or silage, the rate of planting may be such as to produce a third more plants.

The Breeding Plot.

The breeding plot should be on soil representative of that on which the general crop is to be grown. A common mistake of the beginner is to select unusually rich ground or to pile on an abnormally large amount of manure or fertilizer. A thorough preparation of the seed bed and the best of cultivation is desirable, but aside from this the soil conditions should be representative of the average so that the corn will develop normally. The plot should be as far removed from the general corn field as possible unless the seed has been selected from the general crop, in which case, if necessary, the plat may be in one corner of the general field, but preferably in the corner from whence the prevailing wind comes at the time pollen is flying.

The ear row method of breeding and improving corn is the most satisfactory, in fact the only rapid way of improving corn along any line. This method is based on the principle that like begets like, but fortunately this law is not rigid. If every kernel on this ear should produce an ear just like this (exhibited good ear) you would doubtless be well satisfied with the results, but it would exclude the possibility of the further improvement of corn. It is the variation in the progeny of any parent plant that enables us, through selection, to improve the variety, and it is the tendency for like to produce a large percentage of progeny, differing, but slightly, from the parent that enables us to make progress in plant improvement.

Corn improvement by selection is easy because the plant is large and its characteristics plainly visible; because the variations are sufficiently marked and frequent to enable man to select individuals with desirable characteristics, and also because of the large number of plants that can be secured from one individual and the consequent rapidity of multiplication.

Corn breeding is somewhat more difficult because of the natural cross fertilization and the impracticability of keeping the breed pure, and also because close and self-fertilization are difficulties that must be guarded against.

None but the choicest ears selected for desirable qualities of both ear and plant should be used in the breeding plot and any ears that do not show a higher standard in the germination test should be rejected. These desirable ears, usually 80 to 100 in number, may be subjected to a still more rigid selection by dividing into two equal parts, putting the choicest ears all in one lot. The ears from the choicer lot are to be planted each in a separate row and those from the poorer lot may be shelled together and used as bulk seed with which to plant the alternating rows of the breeding plot.

It is well to plant the individual ears in the even numbered rows commencing to number from one side of the plot. The rows should be sufficiently short (usually not more than 400 feet long) so that the corn from each ear may not fail to plant the row. The planting should be made as uniform as possible. It may be done with a planter by removing and changing the seed for each row. A careful record should, of course, be kept of the breeding plot.

Self pollination is generally conceded to be injurious in a naturally cross pollinated plant like corn and a number of experiments at several of our State institutions have demonstrated the assumption to be correct. The progeny of a self fertilized ear of corn may be remarkably uniform, but the plants are usually much reduced in size and vigor and the yield has been reduced to less than half of that from the same variety when cross fertilized. If self fertilization is so injurious, it is reasonable to suppose that close fertilization, i. e.; the interbreeding of closely related individuals would be injurious, but of course to a lesser degree. We have no assurance that no self fertilization takes place under ordinary field conditions, in fact it would seem probable that a small percentage of the kernels of every ear will have been fertilized by pollen from the same plant and it may be that this is largely responsible for the abortive and inferior plants that always occur in every corn field in greater or lesser numbers, no matter how

favorable the conditions. It also seems certain that the bulk of the kernels of any ear are fertilized by pollen from individuals growing in the immediate neighborhood.

In the breeding plot we are using a limited number of individuals. Half of them are planted each in separate rows, all stalks in such rows are therefore closely related being from a common mother. Under these conditions the tendency for close fertilization will be greater than under general field conditions, and unless steps are taken to prevent this it may offset the improvement which we are striving for through selection and breeding. Under these conditions it is probable that twenty-five per cent. of the kernels in the rows planted from individual ears would become self and close fertilized. To eliminate this, detasseling of the rows planted from individual ears has been resorted to.

At tasseling time the tassels are removed from the individual ear rows as soon as they appear. They should also be removed from all inferior abortion or undesirable stalks in the other rows. It is necessary to go over the plot every day during the tasseling period as all tassels do not appear at the same time. The tassels can be pulled out without injury to the stalk. If the corn is tall the work can be made easier by riding a steady horse and using a muzzle to prevent injury to the corn.

Harvesting the Records.

At harvest time records are made from each detasseled row, showing the stand, per cent. of suckers and barren stalks, as well as other characteristics. Seed ears are then selected from sixteen of the most desirable rows and those from each row kept separate and given the number of the row. The rows are now husked, the corn from each, including the ones which were not detasseled, being kept separate and weighed. The object of ascertaining the weight of corn on the tasseled rows from which no seed is selected, is to ascertain the relative yield of the rows from which seed is taken. This is done by comparing the yield of each detasseled row with the average yield of the two adjacent rows which were from the bulk seed. Of course the weight of the seed ears already taken will be included in the rows from which taken.

The seed ears are now stored in a desirable place as previously suggested and so labled that reference can be made to records for the rows from which each lot came. In the Spring, after the germination test has been made, the five best ears or the requisite number are selected from each if the best eight rows and are to be used as the individual ears for the second years breeding plot. The same number of best ears are also selected from the remaining eight rows and used as the bulk seed for the second year's breeding plot. The remainder of the seed may be used either for a part of the general crop or may be used in a small field by itself to produce seed for the next year's crop.

Work of this character systematically followed up will work wonders in the improvement of corn on any farm, and if considerable corn is grown the time will be well paid for. For the small grower it may be more economical to purchase well bred seed. At the present price of corn seed that will produce five bushels per

acre, more than that formerly used, is easily worth $20.00 per bushel. "Five per" is none too much to pay for well bred seed.

A Member: It is said sometimes that as you increase the protein, you decrease the yield; is that so?

PROF. GARDNER: If you treat for just one thing you may lose sight of the others, and let it go back, but in Illinois they have kept up the yield without changing the composition.

MR. GOODERHAM: If it would not be convenient to put but one ear in each row, would that be all right?

PROF. GARDNER: You could put but one ear into every two rows if you choose. Put ear No. 2 into row No. 2, until you have planted twenty individual rows; then begin further down. Or if the row is too long, plant one half with one ear, and the other half of the other kind.

MR. CLARK: Don't detasseling injure the stalk of the corn?

PROF. GARDNER: Not if properly done. Experiment shows that if properly done it actually increases the yield. It should be done before the pollen is formed. It is possible that it may introduce smut, but on the whole, I do not think it injures the corn.

MR. COWAN: What is the proper time to do it?

PROF. GARDNER: Just as soon as they come out; of course, it will be necessary for some man to go through the field every day. You can facilitate the work somewhat by riding a horse with a muzzle on, down the rows.

A Member: What is the object of planting in the individual row?

PROF. GARDNER: The object of planting in the individual row is to get the parent of the crop.

MR. STOUT: Would it be advisable to select the two best specimens of two good varieties of corn and produce a hybrid? Would it improve the corn?

PROF. GARDNER: I would say that it would not be desirable. If they are similar strains, it might possibly give a little increase in vigor, but if there is too much variety, you will get a heterogeneous lot of corn.

MR. STOUT: I presume that is the way they produce the different varieties?

PROF. GARDNER: Sometimes, but usually it is done by selection.

MR. CLARK: Do you think that selection will overcome on poor land?

PROF. GARDNER: No; we cannot overcome poor soil.

MR. HOLMAN: Will a twenty-four row ear of corn reproduce itself?

PROF. GARDNER: Not as a rule; the 24 row ear has usually been pollinated from specimen ears of 18 or 12 rows, but if you take an ear of that kind, and select your rows, the same number, and repeat next year, and go on that way, it is posible that you will soon produce a 24 row ear.

MR. HOLMAN: What is the highest number of rows you have ever seen?

PROF. GARDNER: Well, I have seen 40.

MR. CLARK: Is there anything in the theory that if there are a few wet days while the pollen is falling, there is danger in the fertility the year following?

PROF. GARDNER: Well, it may be possible.

MR. CLARK: If they nearly all tassel at the same time, it might be possible?

PROF. GARDNER: Yes: Weather conditions would bring that about.

MR. HOLMAN: Would it be advisable to try to grow a large number of rows?

PROF. GARDNER: No; as I said before, sixteen to twenty rows is a desirable number.

The CHAIRMAN: Any more questions? If not, we will proceed with the next number on the program, in which Mr. Lighty will give us "Twenty Years Experience in Corn Growing and Breeding."

Mr. Lighty spoke as follows:

TWENTY YEARS EXPERIENCE IN CORN GROWING AND BREEDING.

By L. W. LIGHTY, Belleville, Pa.

Ladies and Gentlemen: It has been my pleasure to do a little teaching along this line at Farmers' Institutes for a number of years. It has been my great pleasure for more years to do a lot of work on the farm along this line. Very often at Farmers' Institutes we are told—well, I don't want to say we are told—the farmers say that these things all sound very nice on the platform, but they don't work out on the farm. Is that a fact? Is it true? I stand here to-day to tell you that I can never repay what I owe to our scientific investigators who made it possible for me to grow larger crops. You have all listened to that excellent address of Prof. Gardner's, and I suppose if you were to listen to me, you would only listen to a repetition of what you have heard before, told better

than I can tell you. If you were to go to sleep, I would not blame you, but I will not talk very long, and possibly you can stay awake. Furthermore, I am glad that there are some of my own neighbors in the audience to-day, and I want them to tell you people from a distance if I am not telling the truth, when I say that by the practice of the theories I have heard here I have made an improvement of 1,000 per cent.—Brother Croll, is that too high?—I want to tell my friends that by the application of the theories that are laid down by the investigators, we can do just what they tell us we can. We can increase the yield of our corn by the intelligent application of the principles they lay down. Of course, we cannot take those principles and use them like a machine—and you would not have it so, although there are some people in some sections of the country who think this is the way it should be done. The principles that are laid down are general principles that must be applied in many sections of country, with many experiments, and under many different conditions.

Now, when I was up in Potter county with Brother Hall, he told me that they have frosts every month, and they have to plant a variety of corn that ripens very quickly, and of course this particular ear that the Professor showed you would not be desirable up there on their high hills. These men have to work out their own problems, and have to work out the principles Professor Gardner laid down for them, and at the same time use their own good judgment in working them. My farmer friends, we have to use more good judgment—more brains, put there on that old farm than any of the lawyers in the city of New York, than in any other profession, if we want to make a success out on that old farm. What we have to do is not written in books, but when we go up against nature, when we are dealing with the Almighty, we have, more than any other class of men, to use our good judgment and our brains.

My experience has been varied. I have had many failures and I learned more from my failures than from my successes. The first thing I learned is that the soil is the most important factor. I don't want to tell you about the soil. That has been done over and over again. I don't want to tell you about it; I simply want to emphasize the fact that if we want to grow a large crop of corn, we want to have that soil in such a condition that it will take up and hold for that soil a large quantity of water. Now, there are some of my neighbors here this morning, and I want to say to them that we have a large amount of big crops of corn here in York. We have some good soil, and some that is only ordinary. We grow big crops to-day, but I recollect the time when we grew larger crops of corn on the hills and valleys of York. We are growing less corn than our forefathers did. Why is that? We got these fields from our good old red friends of the forest; nature had put them on the limestone rocks, and the spring rains and the snows dissolved, and there was much of that vegetable matter called "humus" in the soil to hold the moisture. And then in many cases nature had an almost perfect system of underdrainage. The great trees that grew up and then fell down and mixed with the soil—the leaves from the giant oaks, hickories and shellbarks decayed, and filled that soil with humus. They did not need any of the ingredients we have to-day. They never heard of the commercial fertilizer, of which

we have so much need to-day. They did not even have a Farmers' Institute to teach them how to grow corn, and yet they grew it better than the white man. The red man got more corn without labor, without fertilizer, and without thought. After we have worked hard, and put on fertilizer, and used our brains, we can grow only an average crop. Why is that? With our methods of farming, we have taken out the fertility that nature has placed there. We wanted the corn—we wanted the money that the corn would bring, and we used up the vegetable matter in that soil. Even when I was a boy men said "our corn and our crops are not doing so well as they did when we were boys." What was to be done?

Well, these hills were filled with limestone rock, and they somehow learned that if they burned that rock and put it on the soil, it would fill that soil with humus and grow more corn. So they put on the lime in great quantities. Subsequently the lime chewed up the tough vegetable matter that was still in the soil, and the corn crop grew less and less. You see it works this way: Sometimes you see a horse that does not get enough oats; I have seen such horses in the upper part of York county. When you do not get quite enough work out of that horse, you speak to him kindly, and he will perhaps try to go for a little while; but he stops again, and then you speak to him roughly, and then he gets the whip; but the time comes when the horse does not mind even the whip. You see, what that horse needed was pats, and not the whip. Vegetable matter is what this soil needs, and not the whip. Yesterday in going down to York Haven I saw hills entirely barren, without vegetation of any kind, and yet that farmer knew it and put the whip on it. But he will not get a good crop until he first fills that soil with vegetable matter.

Now, how do we get that soil back to its original condition? We never can, but we can approximate it, and I believe there are quite a number of farmers here who will say that that can be done, as the result of actual practice on the old farm. The best and cheapest method is to apply it in the form of a heavy sod to plow in. Never plow again unless you have a heavy sod to plow under. You will be astonished at the amount of vegetable matter you put into that old soil. I did that, and I have got a good soil. There are times when a man must make a quick sod, and it is wise for a man who has to depend on his dollars, to always have a sod to turn under whenever he wants to plow. I want to say to you, my friends, that I have practised this for many years on that old farm right up here in this county. I never plow unless I have a sod. I do the same thing for wheat. If you get this sod and plow it under, you will be practically sure of a good corn crop. The sod to plow under is the best guide to successful corn culture. I don't care how pretty the ear is, or how many rows it has, or whether it will take the first premium at the National Corn Show, if you don't get your soil full of humus before you plant that seed, you will have a poor crop of corn.

MR. WAYCHOFF: Now, a great many of our farmers are not dairy farmers, and they have no manure to make the sod. Can you give us a better method to make the sod?

MR. LIGHTY: My rule where I did not have the sod, I took a cutaway harrow and made a good seed bed, but I failed many a time.

MR. WAYCHOFF: How much better would the soil be if plowed just after the harrow?

MR. LIGHTY: It might be better; if the soil has got tight, you need something to break up the hard soil.

MR. GLOVER: Why is it that the top soil is always harder than the sub-soil?

MR. LIGHTY: Nature is always trying to do something, and she is trying her best to give you a little vegetable matter.

Now, my friends, I know you are all anxious to get away. I am talking to you about things that every farmer knows and must work out for himself. You must know your own soil. If you don't get at it, and study it, and use your good judgment in the matter. Work all the humus you can, into the sod; plow deep and make a big sponge out of that field, because a big sponge holds more water than a little one.

A Member: What is the best way to get the sod?

MR. LIGHTY: Sow good red clover, and never let those old cows run down.

MR. McCREARY: You say, Mr. Lighty, that you never plow unless you have a sod?

MR. LIGHTY: Never.

MR. McCREARY: How do you get your oats?

MR. LIGHTY: I forgot that; I just leave them out and take out the corn, and put in some rye; and right in there I would sow the grass seed, and then just as soon as I had taken off one or two crops I would put in the oats seed.

MR. CLARK: About plowing time?

MR. LIGHTY: I usually do. I wanted to say something about that plowing. Do you know, we have some excellent plowing in the York Valley? We are all Pennsylvania Dutchmen here—you would not suspect it of me, I know. Now, I like a good, sharp plow, that will cut down deep through that sod, and throw it nicely up hill, so that the top soil will be nicely turned under. A good neighbor of mine, across the way said he would not allow me to do his plowing for him, if I paid him for it. Now, I have trouble in getting a hired man to plow as I want him to, and I want to be there myself when the plowing is done. It does not matter whether you plow in the spring or in the fall, so long as you prepare your soil to conserve the moisture that the corn needs. One of our scientific friends told us here at this Institute that the plant is dependent on the moisture in the soil, and that moisture is brought to the surface by capillary attraction, and that this capillary attraction is brought about by surface tension. I don't know what that is,

but I know that it means that the water is drawn up from the sub-soil, and I also know that when you plow with a good heavy sod, and let the raw surface stand up to the sub-soil, the vegetable matter will rapidly get to work to store the moisture there. If an ear of corn weighs one pound, it will need 40 pounds of water. Ten thousand ears will require ten thousand times forty pounds of water. Think of that, and then think of what these scientific friends have told you about the conservation of moisture. The more we do to conserve this moisture, the more we will have, and the larger corn crop we will have.

MR. HOLMAN: I would like to say to Prof. Gardner that at the corn show at Harrisburg last winter, there was an ear of twenty-four rows, and the old man who produced it said he hoped to live long enough to double it, but he said he did not hope to reproduce it. How do you suppose he expected to do this?

PROF. GARDNER: There is only one way to do that, and that is to have another ear like it, and by selection keep it up. It would be better to have a number of ears, so that you have the relationship.

MR. HALL: I found that the best thing I ever tried to improve poor land was cow peas. They will grow with very little fertility, and are excellent to enrich the soil if plowed down.

The CHAIRMAN: If there is no further discussion on this subject, we will take up the next and last topic of the morning, "Orchard and Garden Insects; How to Control Them," by Mr. William H. Wolff, of West Chester.

Mr. Wolff then spoke as follows:

SOME COMMON ORCHARD AND GARDEN INSECTS; HOW TO CONTROL THEM.

By WM. H. WOLFF, West Chester, Pa.

Mr. Chairman, Ladies and Gentlemen: While it is not well to speak boastfully of what has been done, yet I can assure you to-day that the State of Pennsylvania is well to the forefront in the great work of insect control. You will note, too, that I said "work of insect control," for it is indeed a great work, and it has been conducted in this State in a workmanlike and businesslike manner. The State of Pennsylvania has been liberal in its appropriation to this work and the people are now reaping a rich harvest on their money thus wisely spent in practical economic education. The immense benefits are alike hard to estimate and to realize in their entirety. Let no one foolishly say or think that the farmer only is benefitted by the money thus expended in teaching insect control. He is indeed greatly benefitted, but not less so than are

the people of the towns and cities. For we have only to recall the fact that under natural conditions, that is, with the crops left to themselves without scientific care, the losses due to insects alone will approximate fifty or sixty per cent., and in many instances result in absolutely no crop. Who, then, would be called upon by the general market to pay the prices due to such crop deficiency? It is therefore plain to be seen that this work of teaching the control not only of insects, but of the various factors governing the crop production, must interest, or at least does equally concern the entire citizenship.

The agencies through which the teaching of insect control is done in Pennsylvania are mainly three: The Pennsylvania State College, the Division of Zoology, and the Division of Farmers' Institutes. Each carries on its own work more or less independent of the other two and in its own special field. The work of State College is mostly that of instructing the attending students; field experiments are also always in progress. The Division of Zoology reaches many thousands of citizens through its monthly bulletins and county demonstrations, while the Division of Farmers' Institutes comes into personal touch with thousands more, through its traveling schools, its lecturers and its winter institute work.

The result of all this is a growing confidence on the part of the farmers and horticulturists of the State, born of a certain knowledge of the fundamental principles of insect control. Thus we find a great amount of tree planting is now going on. Pennsylvania nurseries are now selling four or five times as many trees for planting within the State as they did a few years ago.

The nurserymen themselves, also a few years ago in dread of the extermination of their own industries by San José Scale and other insects, have now been shown that these tree and plant enemies may be held in subjection by correct methods.

Have we ever stopped to consider fully enough what the quality of perfection in orchard and garden products means? The production of perfect fruit and perfect vegetables cannot occur in a State of nature, but, perfection in horticultural products is often to-day seen on the markets, and in every case where it is seen, it is to be attributed to applied science and applied art. The work of insects is only one of the many natural factors tending to prevent perfection in our fruits and vegetables. A very closely related and coordinate factor is that of plant diseases. It is in perfection in quality, combined with large yields, that the profits are to be realized to-day, and the factors governing this are so complex that we feel that we can well advise growers to specialize as much as possible with a few crops so as to become thoroughly familiar with these special crops, their requirements and their enemies.

In general, there are a comparatively few insects every season which, more than others, cause us great trouble, but it must also be remembered that almost any insect may become a great pest under certain circumstances. I therefore wish to speak to you of a few very common and troublesome insects, and the most recent developments in their methods of control.

Every one here to-day has heard and read a lot about the San José Scale. It is thoroughly right and proper that you have, and I might add that the State of Pennsylvania would have been sadly

neglectful of its duty if it had not seen to it that its citizens could not help learning of and becoming instructed concerning this most important insect. Many of you in this audience have had a great deal of experience in combating this insect in your own orchards; you have also taught other correct methods.

First, in dealing with materials for the control of the San José Scale, we must speak of the lime-sulfur mixtures. The home-made boiled lime-sulfur mixture has until very recently been the only material officially recommended by our Pennsylvania Division of Zoology. Lately the commercial concentrated lime-sulfur preparations have been recommended. The standard home-made boiled lime-sulfur wash has, when well made and thoroughly applied, given first-class results. This is generally admitted. There is much difficulty and labor attending its preparation and application to the trees, so much so, that many of the largest orchardists have substituted for it the soluble oils. From my own personal experience, the results of observation in the orchards of others, and the published results of experiments, I am confident that as good results are obtained from the use of the best oils at a strength of one part to fifteen of water on apple and pear trees, as with the best lime-sulfur mixture. For peach and plum, however, I prefer the lime-sulfur mixture, applied just before the buds open in the spring, to anything else.

A home-made concentrated lime-sulfur mixture is now prepared on a formula which calls for two pounds of sulfur and one of lime to each gallon of water. These are boiled together for one hour, and finally diluted, one part of six of water. The material may be kept in a concentrated form and the dilution made just before it is applied to the tree. Owing, it is thought, to the higher sulphids formed by the excess of sulfur, there is no crystallization on cooling as is the case with the standard lime-sulfur mixture. I have made and used some of this material at the strength of one to six, and one to four of water, but the experiments are not yet far enough advanced for a definite and certain report. I advise growers who favor lime-sulfur to prepare some of the concentrated lime-sulfur and give it a good, fair trial. If it proves a satisfactory spray in scale-killing power, it has many strong points to recommend it. It will keep in a concentrated form without crystallizing, has very little sediment, and costs not over one cent per gallon.

The soluble oils, since they first came on the market as a remedy against San José Scale, have, as a class, not received favorable comment by our Pennsylvania Division of Zoology. The use of these soluble oils, however, we find is becoming more general, and many of our best Experiment Stations are now recommending them. Maryland, New Jersey and New York, and other states, have now endorsed their use in orchard work. We also find the largest orchardists in this State and elsewhere using freely these soluble oils. These oils have many good points to recommend them. First, it has been shown that those made on a crude oil or paraffine oil basis will kill the scale at a strength of one part to fifteen of water. Secondly, they invariably give a perfect emulsion when simply mixed with water as directed. Third, the labor and delay of boiling, and the delay of nozzle clogging are done away with. Owing to the rapidity of the work thus made possible, the ability to start spray-

ing ten minutes after arriving in the fields in the morning, and the greater surface covering capacity of these oils, it is usually found that the work can be done about as cheaply and much more pleasantly with a soluble oil costing two and one-half cents a gallon, as with the lime-sulfur mixing costing one-half that amount. Prof. Penny, of your own Pennsylvania State College has done a great deal of work on these soluble oils, and in the early part of this session presented to you the results of several years of study. He has presented to you the method of manufacture of a home-made soluble oil on a paraffine basis, the cost of which, applied to the trees is much less than that of the boiled lime-sulfur mixture. Under Prof. Penny's directions, it has been my privilege to make in the spring and fall of 1908 and again this past spring in an experimental way, several hundred gallons of this material. I have used this soluble oil on apple, pear, peach, plum and cherry, at a strength of one part to nineteen of water, and have killed every scale, entirely cleaning up badly encrusted trees. So far I have seen no damage to these trees, and I would recommend that each of you make and try some of this new soluble oil. It is simple to make. I have made several batches and each time have secured a good emulsion.

In my work in the last three years, I have had to use about thirty thousand gallons of "Scalecide," and I can assure you I have yet to see one twig or flower injured by its use, while the trees were dormant. This material will kill every scale covered with it, when used one part to fifteen of water. It is waste to advocate its use stronger than this.

In the past, many times it has been thought necessary to enforce the destruction of many blocks of nursery stock, because found badly infested with scale in early summer. In the case of apples, pears and plums, such destruction will not again be necessary if the nurseryman will only get busy. Mr. Grubb, a student of Cornell University, demonstrated in private nursery experiments during the summer of 1907—and I have many times verified his results—that an emulsion made with naptha soft soap and containing 23 per cent. of kerosene oil, may be applied to apple and pear in summer when the trees are in full foliage, and that this will kill every scale with no apparent damage to the trees. If the spraying is done by August 1st, the scale will fall off and the marks disappear by the end of the season. Care must be taken to cease spraying before the mixture drips and runs down the stem. The application should be made on a bright, preferably a windy day, should be put on as a fine spray, and the spraying should not be repeated at a short interval of time.

In a like manner, plums may be cleaned of scale in the summer while in full foliage by the use in a similar way, of an emulsion containing 17 per cent. kerosene. Just why 17 per cent. suffices to kill all scale on plums and 23 per cent. is required on apple and pear, I cannot say, but experiment shows this to be a fact.

The Codling Moth of the apple, pear and quince is another insect causing yearly immense losses of from fifty to eighty per cent. of the fruit on trees not sprayed. The Paris Green Spray with lime, or in Bordeaux mixture, or the lead arsenate spray, applied as a fine mist, have heretofore been advocated. Two applications at least have been deemed necessary. Prof. Melander of the State of Washington early this spring advocated a practically new method

of spraying for Codling Moth. He uses lead arsenate, and one and one-half pounds to fifty gallons of water and applies it at very high pressure, using the Bordeaux nozzle, and obtaining a coarse-driving fan shaped spray. Instead of allowing the spray to settle down over the tree as a mist, this coarse fan shaped spray is directed straight against and into the little open calyx cups of the forming apple. With one good spraying in this way, he finds he can get better results than with several mist sprayings even when the liquid contains twice the amount of lead arsenate. I have sprayed some apple trees by this new method this spring, and I hope to report comparative results later. It is my opinion that when trees are sprayed for codling moth with this heavy drenching spray, that in order to avoid possible serious Bordeaux injury, the strength of the Bordeaux mixture will have to be reduced, or the Bordeaux spraying will have to be done separately. Indeed, some of our best orchardists are now aiming to substitute the self-boiled lime-sulfur mixed in the place of Bordeaux, owing to the apparent risk of damage from the Bordeaux.

Apple Tree Borers are also the cause of the loss of many fine trees of all ages. The Tyson brothers in their famous orchards of Flora Dale, Adams county, have for the past six years been painting the stems of their apple trees from two inches below the soil surface to a height of fifteen inches with pure white lead and linseed oil. All sizes of trees have been treated, from one year old whips to fifty year old trees, and the results have been most satisfactory in keeping out borers. The trees, as a rule, are re-painted every other year.

One ply tarred paper wrapped securely and tied top and bottom about the base of peach trees is reported on good authority to give first-class protection from the peach tree borer. This wrapping of tarred paper should extend, as in the case of the painting of the apple tree stem, from two inches below the soil level to fifteen inches above, and it should be put on in early spring after the trees have been thoroughly gone over, and the borers in them removed.

So far I have not said anything of garden insects, but there are a few which I must hurriedly mention. With the increased interest and large profits derived from asparagus culture, larger areas are rapidly being devoted to this vegetable. When these larger areas are neglected, the natural enemies are soon sure to appear in increasing numbers. So to-day we have an overincreasing number of inquiries of what to do for the asparagus beetle. The advice is—"get rid of them, of course,"—but how? As the leaves of the plants are mostly thread-like and oily, the poisoned spray in order to remain attached to the plants must be applied as the finest mist possible. I have found such a finely divided spray, containing lead arsenate, three pounds to fifty gallons of water gave excellent results, cleaning up every last one of the young beetles within twenty-four hours. In plantations where the asparagus is large, the material may be divided by means of a barrel sprayer on a sled. This is drawn through the rows by a horse, and the material is thrown on the plants sideways, through nozzles fixed on two upright pipes at the back of the sled. A man stands on the sled and operates the pump. When the asparagus is small, an arrangement of nozzles and pipes similar to that used for spraying field potatoes, may be used.

In cabbage culture, one of the worst enemies is the green cabbage worm, the parent of which is the white cabbage butterfly. When the plants are young, one of the best remedies is to keep them well sprayed with lead arsenate, using about one ounce to the gallon, applied as a very fine mist. This will stick on, and kill the young worms as they hatch. Paris Green may also be used, and a good method is to apply this as a dry dust spray, one part to one hundred parts, by weight, of flour, put on while the plants are damp. Lime or land plaster may be substituted for flour. As the head of the cabbage forms from the inside and the outer leaves are usually thrown away, there is no danger attached to the use of the arsenical poisons, especially the more easily washed off Paris Green, even while the heads are forming. Such a small amount of Paris Green is applied in any case that it has been carefully calculated that it would be necessary for a man to eat at one meal forty cabbages containing all the Paris Green that was originially applied, in order to have even a slight dose of arsenic. By the rain and weathering, the removal of the outer leaves, the washing before the cooking, and straining, as a matter of fact, it would be impossible for him to get anything but the smallest trace of what was originally applied. Notwithstanding these facts, I do not advocate the use of Paris Green on cabbage after the heads begin to form, but much prefer the powdered hellebore or pyretherum, used as a dust spray while the plants are damp.

The Cabbage Root Maggot is sometimes troublesome, and when it occurs, plants may be protected by cutting little circles of tarred paper about six inches in diameter, making a cut with a pair of scissors that would correspond to a radius of their circle, and slipping one of these little cut circles about the base of each plant. The plant would then stand in the center of this paper circle, which would lie flat on the soil surface. These tarred paper circles are not very expensive and if neatly put on are an effective method of protection against the root maggot.

Potato Beetles, or more commonly and erroneously called "bugs" are again becoming troublesome. For many years they had been quite scarce, so much so that many persons thought they had disappeared altogether. Our Economic Zoologist, however, several times took occasion to explain that this could not possibly be the case, and prophesied their early return. Suddenly, last year they did appear, in immense numbers, and because not expected, in many instances caused serious losses before the remedy could be applied and take effect. The standard arsenical poisons are the best means to use for this insect. They are applied as a spray, using two pounds of lead arsenate or about twelve ounces of Paris Green to fifty gallons of water. In case Paris Green is used alone, about two pounds of unslacked lime, or six pounds of slacked lime paste should be added to each barrel of mixture. As a rule, these insecticides when applied to potatoes, should be used in connection with the Bordeaux mixture. The combination will not only give protection against the "bugs," but to a great extent is a preventive against the early and late blights. It also discourages the flea beetles. The yield, even where blights and insects are not in evidence, is often noticeably increased from this spraying. Its proper use is in a large measure equal to an insurance of a potato crop.

I would like to talk to you about many more interesting and important points in insect control work, but here I must stop. I know you are anxious to get away and return to your homes after this splendid four day session of the Farmers' Normal Institute.

A Member: You can use the oil with a hand spray, where it is not possible to do so with the lime-sulfur.

MR. WOLFF: Oh, we used a hand spray with the lime-sulfur spray.

PROF. MENGES: Have you noticed that you killed some of the wood with the oils?

MR. WOLFF: I have never seen any damage done by the scalecide. It may be possible for some very ignorant person to do so, or there may be something wrong with it, and he not know what it is.

PROF MENGES: Is not the objection to spraying with the oils, the fact that they kill some of the wood?

MR. WOLFF: That is the objection, but I have never seen any damage by scalecide, although I have used 30,000 gallons of it.

PROF. MENGES: Did you spray the young sprouts in the trees?

MR. WOLFF: Yes, sir; before the buds came out. We have even sprayed peach buds one-half inch long with scalecide, and seen no bad results. In the apple orchard where the buds have started, I use the lime-sulfur. On the pear trees I prefer to use scalecide. I have an idea that the pear responds better to the use of oils than the apple does. In two orchards where the pear trees grew alongside the apple trees, and were sprayed the same as the apples, with lime-sulfur, without good results, the change to the oils proved beneficial. Just now the whole thing is more or less in the nature of an experiment. By closely watching our trees, we may be able to tell better in two or three years from now.

SECRETARY MARTIN: How do you account, if this be exactly true, for the fact that possibly three-fourths of the fruit growers are using oils instead of lime-sulfur?

MR. WOLFF: They do not say whether they are apple or other trees.

SECRETARY MARTIN: Yes, I think they do. If you will read the last report, I think you will find it so. That is taken from the report of the Adams County Fruit Growers' Association, prepared for the Secretary of Agriculture.

MR. WOLFF: That may be the case, but I am giving you only the results of my own observations and experiments, and I believe that I would prefer in my orchards, on the peach trees lime-sulfur; on the apples, if I could use scalecide, 1 to 15, I would put it on.

MR. WEIDNER: In answer to Mr. Martin's question, why more oil is used than lime-sulfur, I think it is on account of handling it. I think if you ask the growers they will tell you that there is a great

deal of trouble, and often injury, in preparing and handling the lime-sulfur. This last year they used a great deal more lime-sulfur again than they did the year before, in Adams county.

MR. WOLFF: You have brought out another point—the case with which it is applied.

SECRETARY MARTIN: We are not trying to entangle you, but do you think they are doing this simply because it is convenient? You know it is the business of the orchardist with a few hundred acres to do what is best for his trees; not simply what is the most convenient.

MR. WOLFF: I think it is a matter of getting the work done.

SECRETARY MARTIN: I think so—with the best material.

MR. WOLFF: With a man who has ten thousand trees to spray, the problem is to get through with it as quickly as possible. Heretofore there has been a doubt in the minds of the people as to what is best, but when they realize that with the oils they can do the work in one-quarter to one-third of the time, the oils will continue to be used by people who are rushed with work. I use them myself, when I am rushed.

MR. STEPHENS: What is the advantage of this concentrated solution over the old?

MR. WOLFF: The advantage is that the old form cost 3 cents a gallon, while this costs 1 cent.

MR. STEPHENS: I don't mean that; I mean what is the advantage as a spray?

MR. WOLFF: There is none.

MR. STEPHENS: The time required for the boiling of the older standard lime-sulfur is the greatest objection, is it not?

MR. WOLFF: Yes, I think it is.

SECRETARY MARTIN: Mr. Wolff, what advice would you give the farmers of Pennsylvania, hundreds of thousands of them, who have a farm orchard; if they have not been induced to boil the lime-sulfur, would you advise them to do it?

MR. WOLFF: If they have peaches, I would advise them to use the lime-sulfur, if apples, I would use the oils in the proportion of one to fifteen. The efficiency of the oils will depend very largely upon how they are applied. A careful man will get good results from one to sixteen or one to fifteen; if he is not a careful man, he will want to add more of the oil.

MR. BARNES: Now, Mr. Wolff, in regard to the old method of boiling lime-sulfur, do I understand you right that it is not fit for use the day after it is boiled?

MR. WOLFF: Yes, sir; it is of no use except when freshly boiled.

MR. BARNES: But in this concentrated solution, it will be fit for use afterwards?

MR. WOLFF: Yes, sir.

MR. BARNES: I want to say that this spring there was held a demonstration in my orchard, and the lime-sulfur was prepared by the experts of the State. After they got through, there was probably three-quarters of a barrel of the solution left, and I don't know what to do with the stuff, unless I bury it. It does look to me that if it was possible for people who don't know anything about preparing this stuff to find something a little easier to apply than the lime-sulfur, it would help matters. Now, I believe in the use of the lime and sulfur, and for people who have commercial orchards, I believe it will work out very successfully, but for the ordinary farmer there should be something easier to apply.

MR. WOLFF: I have never seen orchards in better condition than those of Dr. Funk and of Mr. Weidner.

SECRETARY MARTIN: Did you visit Mr. Wertz's orchard, and Mr. Ledy's orchard, or Mr. Tyson's orchard?

MR. WOLFF: Mr. Tyson's orchard is in good condition. He uses Scalecide, one to twenty, and he tells me he has already gone over his orchard twice.

SECRETARY MARTIN: He has two hundred and five acres; that is a pretty big orchard.

The CHAIRMAN: Did Mr. Tyson tell you that the reason he abandoned the use of the lime-sulfur was largely because of the effects it had on his own person? He got badly burned in the face at one time.

SECRETARY MARTIN: That was in the early days before its use was thoroughly understood.

A Member: Is scalecide the same thing as a miscible oil?

MR. WOLFF: It is a miscible oil—one of the best.

A Member: You use it in the proportion of one to fifteen?

MR. WOLFF: Yes, sir; thoroughly stirred and dissolved.

MR. WATTS: I would like to ask the gentlemen a question before he leaves the floor, and that is in regard to the use of white-lead for the borers.

MR. WOLFF: I have never seen but the one big experiment along that line, but I think that one alone is enough to show us that it is all right. In Mr. Tyson's orchard they have used it either four or six years—I forget which—and he says they have absolutely no trouble with the borer, either the round head, or the flat eyed borer.

MR. WATTS: I think if I say that three-fourths of the trees in my county die as a result of the borer, I am not making the statement too strong.

MR. HOOVER: I simply want to endorse what has been said. My experience has been that the lime-sulfur will do the work, if thoroughly applied, but the great trouble in many cases is that it is not done thoroughly. Of course, when a tree is too far gone, the only remedy is the axe. When the trees are dry, you can see where you missed them, and then go over them the second time. . By proper attention you can save your trees.

MR. STEPHENS: Mr. Chairman, may I say just one word? I believe we are here to get at the facts in regard to every matter we discuss, and I believe no institute speaker can afford to go out committed to either the use of the lime-sulfur or the oils; what we want to do is to state the advantages and disadvantages of both as fairly as possible. There are a great many people who would use nothing but the lime-sulfur, while others would not use it at all. As a matter of fact, are not both the oils and the lime-sulfur doing good work? Although I represent another Department of the State work, I use constantly large quantities of both the lime-sulfur and other materials, and, no matter what we are doing, I think we should be fair, and state the advantages of both, and the difference between them.

The CHAIRMAN: The next will be the closing remarks, which I suppose Mr. Martin will offer.

SECRETARY MARTIN: I have nothing to say except to express my gratification at your interest and attention during this week. I bespeak for you all a safe journey home, and a successful year in your work.

PROF. MENGES: Mr. Chairman, may I introduce to the audience a gentleman who has been in the agricultural implement business for the last forty or forty-five years, and who has also attained prominence through the State and nation in matters economic as well? I would like to introduce the Hon. A. B. Farquhar.

MR. FARQUHAR: I don't intend to make a speech, but I would like to meet you all as friends and co-workers. I have been interested in agriculture all my life and I am over three-score and ten. My ancestors for several hundred years were interested in agriculture. New ideas, new thoughts, and new standards are the result ments, my success must depend on yours, which, in turn, is to some extent dependent on the improved implements you use.

I have listened to your remarks here with a great deal of interest, and have read some of the addresses in the papers. Poultry Associations are of great value to the breeders of poultry the same thing applies to the dairy interest, and of every other branch of agriculture. New idea, new thoughts, and new standards are the result of these meetings. The farm has its innings to-day. We hear people who say the country is cropped out, but when we are inclined to that view, we need only look at the old country, where they raise larger crops to the acre than we do, on lands that have been farmed for many hundred years. There is no danger in that direction if proper methods of farming are followed.

I am very much interested in your work, and thank you for allowing me this opportunity to express it.

The CHAIRMAN: Any other remarks? If not, I am ready to receive a motion to adjourn.

MR. CLARK: I move we adjourn.

This motion was properly seconded, and regularly carried, and the Normal Institute for 1909 adjourned.

A. L. MARTIN,
Director of Institutes.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF AGRICULTURE

BULLETIN No. 172.

THE BANG METHOD

FOR THE

Repression of Tuberculosis in Cattle

BY

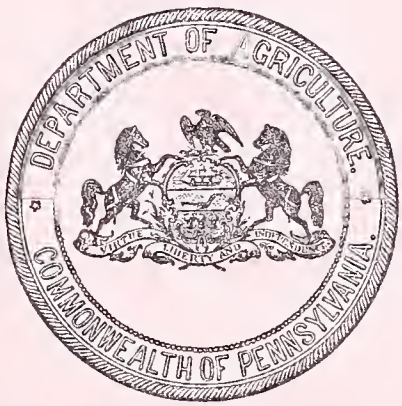
BERNHARD BANG,

PROFESSOR AT THE ROYAL VETERINARY AND AGRICULTURAL COLLEGE AT COPENHAGEN, DENMARK, AND CHIEF VETERINARIAN TO THE DANISH GOVERNMENT.

WITH AN INTRODUCTION BY

LEONARD PEARSON,

STATE VETERINARIAN OF PENNSYLVANIA.



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